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NATIONAL EMISSION STANDARDS STUDY REPORT. APPENDIX - VOLUME 2. APPENDIX F (PART 1)

National Air Pollution Control Administration
Washington, D. C.

March 1970

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NATIONAL EMISSION STANDARDS STUDY

Report

Appendix-Volume 2:
Appendix F (Part 1)

A Report To The Congress of The United States
By The Secretary of Health, Education, And Welfare
In Compliance With
Public Law 90-148
Clean Air Act, As Amended

March 1970

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service
Environmental Health Service
National Air Pollution Control Administration

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U S Department of Commerce
Springfield VA 22151

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APPENDIX F

MAJOR STATIONARY SOURCES OF AIR POLLUTION AND THEIR CHARACTERISTICS

Part 1

APPENDIX F

MAJOR STATIONARY SOURCES OF AIR POLLUTION AND THEIR CHARACTERISTICS

F.1 SOURCE DESCRIPTIONS

Brief descriptions of some of the major industrial manufacturing processes which emit air pollutants during operation are set forth in this appendix (in two volumes) including maps of plant distributions by State and detailed listings of plants, their capacities, and locations. The reference list is included at the end of Part 2 of this appendix.

F.2 Carbon Black

Carbon black, a finely divided material (10-400 millimicrons in diameter), is used primarily as a reinforcing agent for rubber and as a colorant for paper, paint, plastics, and printing ink. The fine carbon particles are manufactured either by burning gaseous or liquid hydrocarbons in a limited supply of air or by thermal decomposition. The processes employed are four: the gas furnace process, oil furnace process, channel process, and thermal process. In the thermal process, the feed stock is decomposed by heat into carbon black and hydrogen but without burning, in contrast to the other processes.

Carbon black is manufactured at 31 plants(1) (see table F-2). Production for 1967 was 1,242,000 tons,(1) with individual plant capacities ranging from 25-318 million pounds annually. Plant locations vary from urban to rural sites; 33 percent are situated in SMSA's. Twenty-three plants are located in Texas and Louisiana. Figure F-1 is a map depicting the geographical distribution of the carbon black plants.

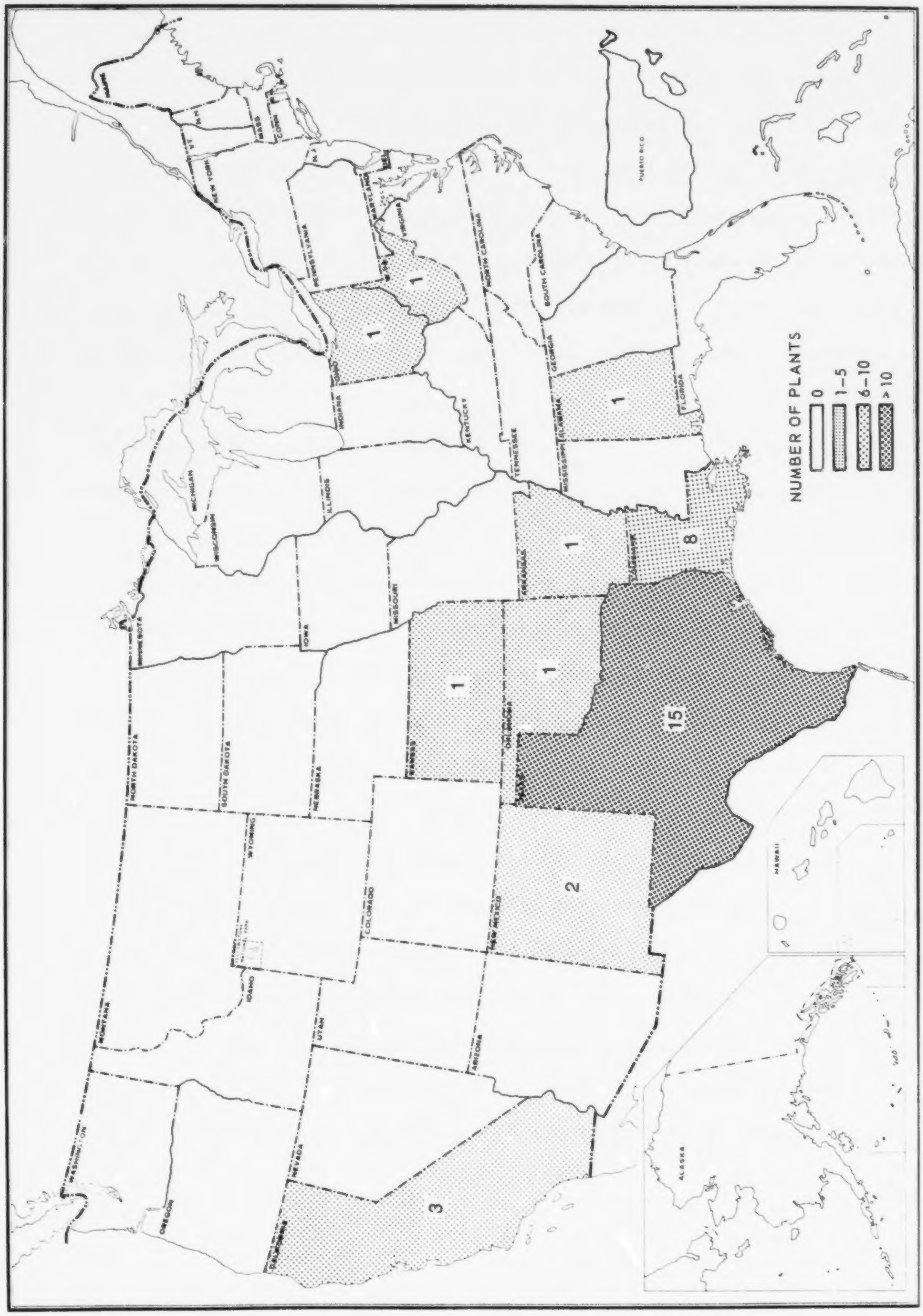
NUMBER OF PLANTS
0
1–5
6–10
>10
15
8
3
2
1
1
1
1
1
1
1
PUERTO RICO
HAWAII
ALASKA

Figure F-1. Carbon black plants, 1968.

Of the four major manufacturing processes, the channel process is the one for which there is no satisfactory method of emission control. This is because any attempt to separate the vent gas from the escaping black upsets burning conditions in the "hot houses" and drastically affects yield and quality. Copious volumes of dense black smoke are vented to the atmosphere; photographs from orbiting satellites have shown identifiable smudges from this type plant. About 6 percent of production is derived from channel plants; further phasing out of this process is likely.

The two furnace processes and the thermal process are amenable to emission control. Types of equipment commonly used for separating and collecting the black from a gas stream are mechanical agglomerators, fabric filters, electrostatic precipitators, inertial separators, and to a lesser degree, wet scrubbers. Recovery of more than 99 percent of black can be achieved by combinations of equipment in series with a fabric filter constituting the final separation step. Typical efficiencies of various separating and collecting equipment for a carbon black stream containing 14 grains/cu ft is shown in table F-1.

As a consequence of incomplete combustion of hydrocarbons, carbon monoxide and hydrogen are also released to the atmosphere; hydrogen sulfide and free sulfur may also be released depending on the sulfur content of the feed stock. Incineration can effect complete combustion, but this would release sulfur oxides and thus introduce another pollution problem. Extent of sulfur oxide pollution from this phase of the manufacturing process requires further evaluation.

In contrast to sooty and grimy conditions usually associated with carbon black plants of a few years ago, proper controls and operations that contribute little to ambient soiling now allow all but the channel plants to be situated in populated areas. Malfunction of control equipment would, however, cause a serious problem.

Table F-1. TYPICAL EFFICIENCY OF VARIOUS SEPARATING AND COLLECTING EQUIPMENT FOR A CARBON BLACK STREAM CONTAINING 14 grains/cu ft [a]

Type	Percent recovery	Discharge concentration gr/cu ft
Electrostatic precipitator	20	11
Cyclone separator	50	7
Scrubber	75-85	2-4
Bag filter	99.9+	0.01

[a] I. Drogin, J. Air Pollution Control Assoc., 18:216-228 (1968).

Table F-2. CARBON BLACK PLANTS
1968

State County	SMSA	Company	Capacity, Million Pounds Per Year Furnace	 Thermal	 Channel
ALABAMA					
Russell	Columbus	Continental Carbon Co.	50**	--	--
ARKANSAS					
Union	--	Columbian Carbon Co., Pigments and Elastomers Div.	87	--	--
CALIFORNIA					
Kern	Bakersfield	Ashland Oil & Refining Co., Carbon Black and Synthetic Rubber Div.	64	--	--
Kern	Bakersfield	Continental Carbon Co.	50	--	--
Kern	Bakersfield	Columbian Carbon Co., Pigments and Elastomers Div.	60*	--	--
KANSAS					
Grant	--	Columbian Carbon Co., Pigments and Elastomers Div.	52	--	--
LOUISIANA					
Avoyelles	--	Columbian Carbon Co., Pigments and Elastomers Div.	70	--	--
Calcasieu	Lakes Charles	Continental Carbon Co.	100	--	--
Evangeline	--	Cabot Corp.	170	--	--
Ouachita	Monroe	Commercial Solvents Corp., Thermatomic Carbon Co. Div.	--	155	--
St. Mary	--	Ashland Oil & Refining Co., Carbon Black and Synthetic Rubber Div.	163		

State County	SMSA	Company	Capacity, Million Pounds Per Year Furnace	 Thermal	 Channel
LOUISIANA (cont.)					
St. Mary	--	Columbian Carbon Co., Pigments and Elastomers Div.	110	30	--
St. Mary	--	Cabot Corp.	170	159	--
West Baton Rouge	--	Sid Richardson Carbon Co.	60*	--	--
NEW MEXICO					
Lea	--	Continental Carbon Co.	--	--	25
Lea	--	Ashland Oil & Refining Co., Carbon Black and Synthetic Rubber Div.	--	--	30
OKLAHOMA					
Kay	--	Continental Carbon Co.	75	--	--
OHIO					
Lucas	Toledo	Phillips Petroleum Co.	60*	--	--
Washington	--	Ashland Oil & Refining Co., Carbon Black and Synthetic Rubber Div.	100	--	--
TEXAS					
Carson	--	Cabot Corp.	--	--	36
Ector	Odessa	Sid Richardson Carbon Co.	--	--	60
Gaines	--	Columbian Carbon Co., Pigments and Elastomers Div.	111	--	--
Gaines	--	Columbian Carbon Co., Pigments and Elastomers Div.	--	--	40
Gray	--	Cabot Corp.	48	--	--

State County	SMSA	Company	Capacity, Million Pounds Per Year		
			Furnace	Thermal	Channel
TEXAS (cont.)					
Harris	Houston	J. M. Huber Corp.	125	--	--
Howard	--	Cabot Corp.	120	--	--
Howard	--	Sid Richardson Carbon Co.	68	--	--
Hutchinson	--	J. M. Huber Corp.	125	30*	10
Hutchinson	--	Phillips Petroleum Co.	318	--	--
Montgomery	Houston	Columbian Carbon Co., Pigments and Elastomers Div.	91	--	--
Moore	--	Continental Carbon Co.	60	--	--
Orange	Orange-Beaumont-Port Arthur	Phillips Petroleum Co.	95	--	--
San Patricio	Corpus Christi	Ashland Oil & Refining Co., Carbon Black and Synthetic Rubber Div.	127	--	--
Wheeler	--	Ashland Oil & Refining Co., Carbon Black and Synthetic Rubber Div.	100	--	--
WEST VIRGINIA					
Wood	--	Cabot Corp.	100	--	--

---

* Scheduled 1969

** Scheduled 1970

F.3 Cement

Portland cement is made by either the wet or the dry process. Either process includes four major operations: quarrying and crushing, grinding and blending, clinker production, and finish grinding and packaging. Raw materials introduced into the kiln in the wet process are ground to form a slurry, whereas in the dry process, the moisture content is reduced to less than 1 percent before or during raw grinding. As much as 55 percent of kiln dust particles may be smaller than 10 microns; the maximum particle size is about 60 microns.(2)

There were 178 active plants(3) (see table F-4) with a capacity of 506,590,000 barrels of cement in 1968.(4) (One barrel is equivalent to 376 pounds of cement.) This was about 77 percent of total production capacity. Plant size or capacity varies from under 1/2 million to 16 million barrels per year. Cement plants are located in 41 States; Pennsylvania leads with 20; Texas has 19; California, 15; New York, 11; Michigan, 10; Ohio and Alabama, 9 plants. A map showing geographical distribution of the cement plants is shown in figure F-2.

The main source of emissions in a cement plant is the kiln used for clinker production. The kilns, which are rotating steel cylinders lined with refractory brick, range from 6 feet in diameter by 60 feet in length to 25 feet in diameter by 760 feet in length. Today's trend toward economics of size favors large plants with large kilns. The raw material input to the kiln is calcined at approximately 2,900°F by burning gas, oil, or coal. Gases leaving the kiln carry an average of about 46 pounds of dust per barrel of finished cement in the dry process and about 38 pounds in the wet process.(2) The wet process is used in nearly two-thirds of the plants in the United States.

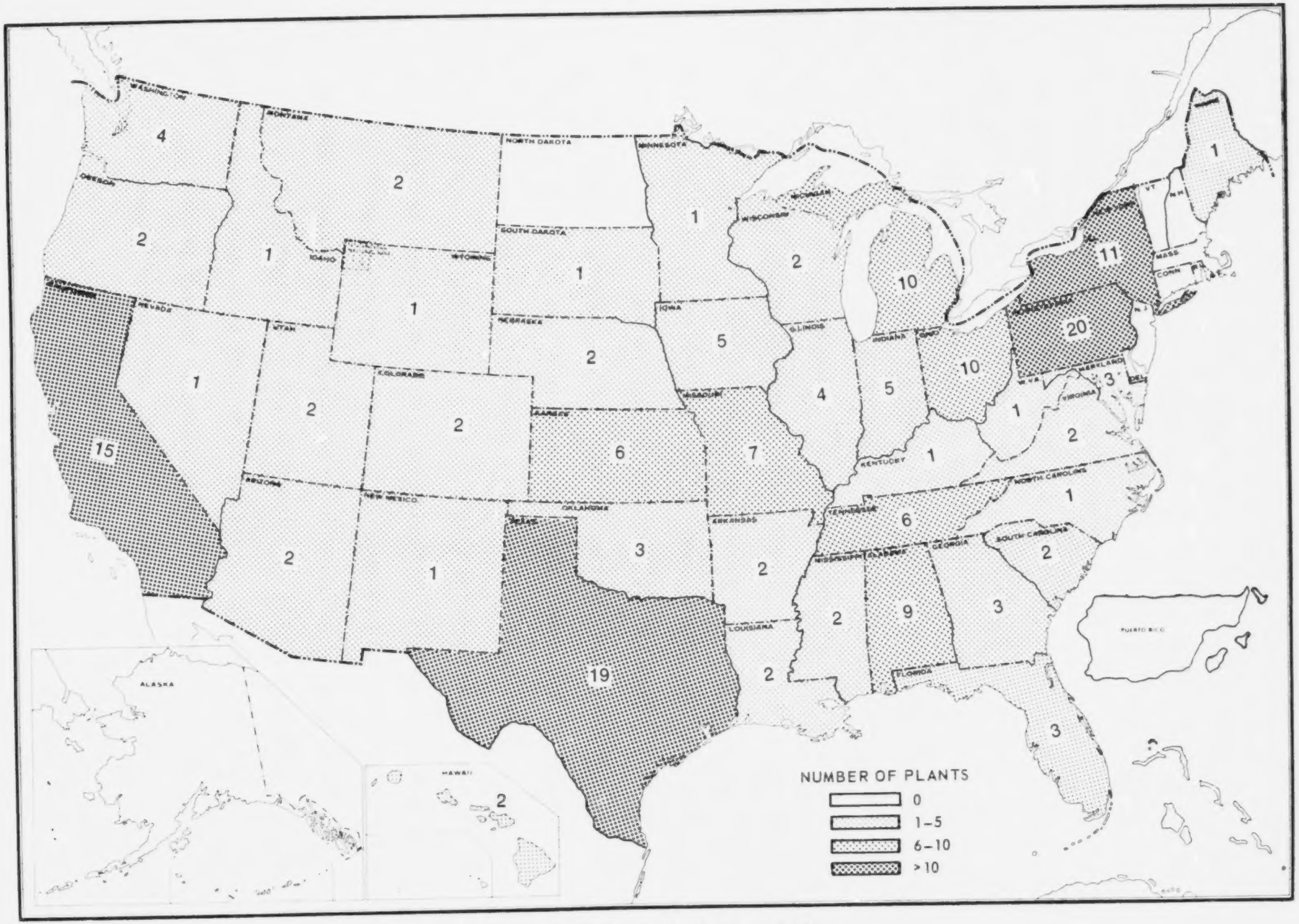
WASHINGTON
4
MONTANA
2
NORTH DAKOTA
MINNESOTA
1
OREGON
2
IDAHO
1
WYOMING
1
SOUTH DAKOTA
1
WISCONSIN
2
MICHIGAN
10
VT
NH
1
NEW YORK
11
MASS
CONN
R.I.
CALIFORNIA
15
NEVADA
1
UTAH
2
COLORADO
2
NEBRASKA
2
IOWA
5
ILLINOIS
4
INDIANA
5
OHIO
10
PENNSYLVANIA
20
MARYLAND
3
DEL
1
VIRGINIA
2
KANSAS
6
MISSOURI
7
KENTUCKY
1
NORTH CAROLINA
1
ARIZONA
2
NEW MEXICO
1
OKLAHOMA
3
TEXAS
19
ARKANSAS
2
TENNESSEE
6
SOUTH CAROLINA
2
LOUISIANA
2
MISSISSIPPI
2
ALABAMA
9
GEORGIA
3
FLORIDA
3
PUERTO RICO
ALASKA
HAWAII
2
NUMBER OF PLANTS
0
1–5
6–10
>10

Figure F-2. Cement plants, 1968.

The quantity of emissions from kilns is of such magnitude that high efficiency collection equipment is required. Since inertial separators range in efficiency from 60 to 87 percent, they alone cannot remove sufficient dust to prevent an air pollution problem. Thus, fabric filters or electrostatic precipitators, usually preceded by mechanical collectors, should be used to reduce emissions to a satisfactory level. Tests indicate that even though older electrostatic precipitators obtain efficiencies of 96-97 percent they do not sufficiently reduce emissions to prevent unsatisfactory ambient air conditions.(2) Recovery of dust usually provides an economic return of up to about 90 percent of the kiln emission. With collection efficiency in the 99 percent range, additional processing of the dust may be required before it can be reintroduced into the system.

In certain cases, a water pollution problem may arise. As collection efficiency approaches the upper end of the 95-99+ range, capital and operating costs increase rapidly. Since electrostatic precipitator manufacturers do not supply a performance guarantee based on a visual standard, difficulty in meeting opacity regulations and operating difficulties may occur in wet process systems for which fabric filtration has been unsatisfactory due to high moisture content of gases. Table F-3 shows collection efficiencies required to meet selected emission regulations.

Gaseous emissions from the combustion of fuel in kilns usually do not create significant air pollution problems. Most of the sulfur dioxide from the sulfur in the fuel is recovered as it combines with the alkalies and lime. Nitrogen oxides that can form at kiln temperatures may be of some concern, particularly in areas that experience photochemical type air pollution. Odoriferous hydrogen sulfide and polysulfides may also be produced when the raw material is composed of marl, sea shells, shale, or clay.

Table F-3. ESTIMATED COLLECTION EFFICIENCIES NEEDED TO MEET SELECTED EMISSION REGULATIONS(2)

Capacity of kiln, bbl per day	Type of fuel	Process weight raw material plus solid fuel, lb per hour	Approximate dust collection efficiency needed to meet control regulations, %	
			L[a]	B[b]
2,000	Coal	57,600	98.3	98.3
2,000	Oil or gas	50,000	98.5	98.5
4,000	Coal	115,000	99.6	99.6
4,000	Oil or gas	100,000	99.6	99.6
6,000	Coal	173,000	99.7	99.6
6,000	Oil or gas	150,000	99.7	99.6
8,000	Coal	230,000	99.8	99.7
8,000	Oil or gas	200,000	99.8	99.7

[a] Los Angeles Air Pollution Control District.

[b] Bay Area Air Pollution Control District (San Francisco).

Table F-4. CEMENT PLANTS
January 1968

State City	SMSA	Company (Including Divisions)	Capacity, Barrels/Year
ALABAMA			
Birmingham	Birmingham	Alpha Portland Cement Co.	1,800,000
Birmingham	Birmingham	Lehigh Portland Cement Co.	1,840,000
Birmingham	Birmingham	Lone Star Cement Corp.	1,900,000
Birmingham	Birmingham	Martin-Marietta Corp.	no kiln operation
Demopolis	--	Lone Star Cement Corp.	1,500,000
Leeds	--	Universal Atlas Cement Co., Div. U.S. Steel Corp.	2,000,000
Mobile	Mobile	Ideal Basic Industries, Inc.	3,000,000
Ragland	--	National Cement Co.	1,500,000
Roberta	Birmingham	Southern Cement Co., Div. Martin-Marietta Corp.	2,600,000
ARIZONA			
Clarkdale	--	Phoenix Cement Co., Div. American Cement Corp	2,600,000
Rillito	Tucson	Arizona Portland Cement Co.	2,700,000
ARKANSAS			
Foreman	--	Arkansas Cement Corp.	5,000,000
Okay	--	Ideal Basic Industries, Inc.	1,850,000
CALIFORNIA			
Colton	San Bernardino-Riverside-Ontario	California Portland Cement Co.	4,500,000
Davenport	--	Pacific Cement & Aggregates, Inc.	3,000,000
Lebec	Bakersfield	Pacific Western Industries, Inc.	3,000,000

State City	SMSA	Company (Including Divisions)	Capacity, Barrels/Year
CALIFORNIA (cont.)			
Lucerne Valley	San Bernardino-Riverside-Ontario	Kaiser Cement & Gypsum Corp.	5,400,000
Mojave	Bakersfield	California Portland Cement Co.	6,000,000
Monolith	Bakersfield	Monolith Portland Cement Co.	4,000,000
Oro Grande	San Bernardino-Riverside-Ontario	Riverside Cement Corp., Div. American Cement Corp.	6,500,000
Permanente	San Jose	Kaiser Cement & Gypsum Corp.	8,500,000
Redding	--	Calaveras Cement Co., Div. The Flintkote Co.	1,700,000
Redwood City	San Francisco-Oakland	Ideal Basic Industries, Inc.	2,550,000
Riverside	San Bernardino-Riverside-Ontario	Riverside Cement Co., Div. American Cement Corp.	4,750,000
Riverside	San Bernardino-Riverside-Ontario	Riverside Cement Co., Div. American Cement Corp.	650,000
San Andreas	--	Calaveras Cement Co.	5,000,000
San Juan Bautista	--	Ideal Basic Industries, Inc.	1,000,000
Victorville	San Bernardino-Riverside-Ontario	Southwestern Portland Cement Co.	6,000,000
COLORADO			
Portland	--	Ideal Basic Industries, Inc.	2,200,000
Boettcher	--	Ideal Basic Industries, Inc.	2,800,000
FLORIDA			
Miami	Miami	General Portland Cement Co.	2,500,000
Miami	Miami	Lehigh Portland Cement Co.	2,700,000
Tampa	Tampa-St. Petersburg	General Portland Cement Co.	7,000,000
GEORGIA			
Atlanta	Atlanta	Southern Cement Co., Div. Martin-Marietta Corp.	1,440,000
Clinchfield	Macon	Penn-Dixie Cement Corp.	2,560,000
Rockmart	--	Marquette Cement Mfg. Co.	1,280,000

State City	SMSA	Company (Including Divisions)	Capacity, Barrels/Year
HAWAII			
Waianae, Honolulu	Honolulu	Kaiser Cement & Gypsum Corp.	1,700,000
Waipahu, Oahu	--	Hawaiian Cement Corp.	1,000,000
IDAHO			
Inkom	--	Idaho Portland Cement Co.	1,200,000
ILLINOIS			
Dixon	--	Medusa Portland Cement Co.	3,650,000
LaSalle	--	Alpha Portland Cement Co.	1,500,000
Oglesby	--	Marquette Cement Mfg. Co.	3,950,000
Joppa	--	Missouri Portland Cement Co.	3,000,000
INDIANA			
Buffington	Gary-Hammond-East Chicago	Universal Atlas Cement Co., Div. U.S. Steel Corp.	9,700,000
Greencastle	--	Lone Star Cement Corp.	4,000,000
Logansport	--	Louisville Cement Co.	1,200,000
Mitchell	--	Lehigh Portland Cement Co.	2,725,000
Speed	Louisville	Louisville Cement Co.	5,250,000
IOWA			
Davenport	Davenport-Rock Island-Moline	Dewey Portland Cement Co., Div. Martin-Marietta Corp.	3,720,000
Des Moines	Des Moines	Marquette Cement Mfg. Co.	2,220,000
Mason City	--	Lehigh Portland Cement Co.	3,340,000
Mason City	--	Northwestern States Portland Cement Co.	4,000,000
West Des Moines	Des Moines	Penn-Dixie Cement Corp.	2,410,000
KANSAS			
Bonner Springs	Kansas City	Lone Star Cement Corp.	2,400,000

State City	SMSA	Company (Including Divisions)	Capacity Barrels/Year
KANSAS (cont.)			
Chanute	--	Ash Grove Lime & Portland Cement Co.	2,800,000
Fredonia	--	General Portland Cement Co.	2,300,000
Humbolt	--	Monarch Cement Co.	2,400,000
Independence	--	Universal Atlas Cement Co., Div. U.S. Steel Corp.	2,200,000
Iola	--	Lehigh Portland Cement Co.	1,340,000
KENTUCKY			
Kosmosdale	Louisville	Kosmos Portland Cement Co., Inc., Div. The Flintkote Co.	4,000,000
LOUISIANA			
Baton Rouge	Baton Rouge	Ideal Basic Industries, Inc.	3,000,000
New Orleans	New Orleans	Lone Star Cement Corp.	1,500,000
MAINE			
Thomaston	--	Dragon Cement Co., Div. Martin-Marietta Corp.	2,000,000
MARYLAND			
Lime Kiln	--	Alpha Portland Cement Co.	2,250,000
Hagerstown	--	Marquette Cement Mfg. Co.	2,050,000
Union Bridge	Baltimore	Lehigh Portland Cement Co.	3,500,000
MICHIGAN			
Alpena	--	Huron Portland Cement Co., Sub. National Gypsum Co.	16,000,000
Bay City	Bay City	Aetna Portland Cement Co., Div. Martin-Marietta Corp.	8,800,000
Cement City	Jackson	General Portland Cement Co., Peninsular Div.	1,200,000

State City	SMSA	Company (Including Divisions)	Capacity, Barrels/Year
MICHIGAN (cont.)			
Charlevoix	--	Medusa Portland Cement Co.	4,000,000
Detroit	Detroit	Peerless Cement Co., Div. American Cement Corp.	3,700,000
Detroit	Detroit	Peerless Cement Co., Div. American Cement Corp.	1,800,000
Dundee	Toledo	Dundee Cement Co.	6,000,000
Petoskey	--	Penn-Dixie Cement Co.	3,490,000
Port Huron	--	Peerless Cement Co., Div. American Cement Corp.	1,000,000
Wyandotte	Detroit	Wyandotte Chemicals Corp.	2,000,000
MINNESOTA			
Duluth	Duluth-Superior	Universal Atlas Cement Co., Div. U.S. Steel Corp.	2,000,000
MISSISSIPPI			
Brandon	Jackson	Marquette Cement Mfg. Co.	1,375,000
Redwood	--	Mississippi Valley Portland Cement Co.	2,000,000
MISSOURI			
Cape Girardeau	--	Marquette Cement Mfg. Co.	3,240,000
Festus	St. Louis	River Cement Co., Div. Missouri River & Fuel Corp.	3,000,000
Hannibal	--	Universal Atlas Cement Co., Div. U.S. Steel Corp.	2,200,000
Clarksville	--	Dundee Cement Co.	7,000,000
Lemay	St. Louis	Alpha Portland Cement Co.	2,600,000
St. Louis	St. Louis	Missouri Portland Cement Co.	5,000,000
Sugar Creek	Kansas City	Missouri Portland Cement Co.	3,000,000
MONTANA			
Montana City	--	Kaiser Cement & Gypsum Corp.	1,400,000

State City	SMSA	Company (Including Divisions)	Capacity, Barrels/Year
MONTANA (cont.)			
Trident	--	Ideal Basic Industries, Inc.	1,500,000
NEBRASKA			
Louisville	--	Ash Grove Lime & Portland Cement Co.	3,500,000
Superior	--	Ideal Basic Industries, Inc.	1,300,000
NEVADA			
Fernley	--	Nevada Cement Co.	3,000,000
NEW MEXICO			
Tijeras	Albuquerque	Ideal Basic Industries, Inc.	2,800,000
NEW YORK			
Alsen	--	Lehigh Portland Cement Co.	2,650,000
Buffalo	Buffalo	Lehigh Portland Cement Co.	2,340,000
Catskill	--	Alpha Cement Co.	3,000,000
Catskill	--	Marquette Cement Mfg. Co.	3,300,000
Cementon	--	Alpha Portland Cement Co.	3,000,000
Glens Falls	--	Glens Falls Portland Cement Co., Div. The Flintkote Co.	1,850,000
Howes Cave	--	Penn-Dixie Cement Corp.	1,840,000
Hudson	--	Universal Atlas Cement Co., Div. U.S. Steel Corp.	4,300,000
Jamesville	Syracuse	Alpha Portland Cement Co.	900,000
Kingston	--	Hudson Cement Corp.	4,000,000
Ravena	Albany-Schenectady-Troy	Atlantic Cement Co., Inc.	10,000,000
NORTH CAROLINA			
Castle Hayne	Wilmington	Ideal Basic Industries, Inc.	3,500,000

State City	SMSA	Company (Including Divisions)	Capacity, Barrels/Year
OHIO			
Barberton	Akron	PPG Industries, Inc., Chemical Div.	1,500,000
Fairborn	Dayton	Southwestern Portland Cement Co.	3,300,000
Fairborn	Dayton	Universal Atlas Cement Co., Div. U.S. Steel Corp.	2,500,000
Ironton	Huntington-Ashland	Alpha Portland Cement Co.	1,200,000
Middle Branch	Canton	Diamond Portland Cement Co., Div. The Flintkote Co.	3,000,000
Paulding	--	General Portland Cement Co.	2,500,000
Toledo	Toledo	Medusa Portland Cement Co.	1,500,000
Superior	Huntington-Ashland	Marquette Cement Mfg. Co.	1,370,000
Zanesville	--	PPG Industries, Inc., Chemical Div.	3,000,000
OKLAHOMA			
Ada	--	Ideal Basic Industries, Inc.	3,500,000
Pryor	--	Oklahoma Cement Co.	2,000,000
Tulsa	Tulsa	Dewey Portland Cement Co., Div. Martin-Marietta Corp.	2,800,000
OREGON			
Lime	--	Oregon Portland Cement Co.	1,200,000
Lake Oswego	--	Oregon Portland Cement Co.	3,500,000
PENNSYLVANIA			
Bath	Allentown-Bethlehem-Easton	Keystone Portland Cement Co.	3,300,000
Bessemer	--	Bessemer Cement Co., Div. Diamond-Shamrock Corp.	4,700,000
Bethlehem	Allentown-Bethlehem-Easton	National Portland Cement Co.	2,000,000
Cementon	Allentown-Bethlehem-Easton	Whitehall Cement Mfg. Co.	3,000,000
Coplay	Allentown-Bethlehem-Easton	Coplay Cement Mfg. Co.	-

State City	SMSA	Company (Including Divisions)	Capacity, Barrels/Year
PENNSYLVANIA (cont.)			
Egypt	Allentown-Bethlehem-Easton	Giant Portland Cement Co.	1,850,000
Evansville	Reading	Allentown Portland Cement Co., Sub. National Gypsum Co.	5,000,000
Fogelsville	Allentown-Bethlehem-Easton	Lehigh Portland Cement Co.	2,210,000
Nazareth	Allentown-Bethlehem-Easton	Lone Star Cement Corp.	3,600,000
Nazareth	Allentown-Bethlehem-Easton	Nazareth Cement Co.	2,400,000
Nazareth	Allentown-Bethlehem-Easton	Penn-Dixie Cement Corp.	1,840,000
Pittsburgh	Pittsburgh	Marquette Cement Mfg. Co.	2,000,000
Northampton	Philadelphia	Dragon Cement Co., Div. Martin-Marietta Corp.	2,000,000
Northampton	Philadelphia	Universal Atlas Cement Co., Div. U.S. Steel Corp.	2,900,000
Stockertown	Allentown-Bethlehem-Easton	Hercules Cement Co., Div. American Cement Corp.	3,500,000
Universal	Pittsburgh	Universal Atlas Cement Co., Div. U.S. Steel Corp.	2,600,000
Wampum	--	Medusa Portland Cement Co.	2,650,000
West Conshohocken	Philadelphia	Allentown Portland Cement Co., Sub. National Gypsum Co.	2,100,000
West Winfield	--	Penn-Dixie Cement Corp.	1,910,000
York	York	Medusa Portland Cement Co.	2,500,000
SOUTH CAROLINA			
Harleyville	--	Giant Portland Cement Co., Carolina Giant Div.	4,000,000
Holly Hill	--	Santee Portland Cement Corp.	2,000,000
SOUTH DAKOTA			
Rapid City	--	South Dakota Cement Plant	3,300,000
TENNESSEE			
Cowan	--	Marquette Cement Mfg. Co.	950,000

State City	SMSA	Company (Including Divisions)	Capacity, Barrels/Year
OHIO			
Barberton	Akron	PPG Industries, Inc., Chemical Div.	1,500,000
Fairborn	Dayton	Southwestern Portland Cement Co.	3,300,000
Fairborn	Dayton	Universal Atlas Cement Co., Div. U.S. Steel Corp.	2,500,000
Ironton	Huntington-Ashland	Alpha Portland Cement Co.	1,200,000
Middle Branch	Canton	Diamond Portland Cement Co., Div. The Flintkote Co.	3,000,000
Paulding	--	General Portland Cement Co.	2,500,000
Toledo	Toledo	Medusa Portland Cement Co.	1,500,000
Superior	Huntington-Ashland	Marquette Cement Mfg. Co.	1,370,000
Zanesville	--	PPG Industries, Inc., Chemical Div.	3,000,000
OKLAHOMA			
Ada	--	Ideal Basic Industries, Inc.	3,500,000
Pryor	--	Oklahoma Cement Co.	2,000,000
Tulsa	Tulsa	Dewey Portland Cement Co., Div. Martin-Marietta Corp.	2,800,000
OREGON			
Lime	--	Oregon Portland Cement Co.	1,200,000
Lake Oswego	--	Oregon Portland Cement Co.	3,500,000
PENNSYLVANIA			
Bath	Allentown-Bethlehem-Easton	Keystone Portland Cement Co.	3,300,000
Bessemer	--	Bessemer Cement Co., Div. Diamond-Shamrock Corp.	4,700,000
Bethlehem	Allentown-Bethlehem-Easton	National Portland Cement Co.	2,000,000
Cementon	Allentown-Bethlehem-Easton	Whitehall Cement Mfg. Co.	3,000,000
Coplay	Allentown-Bethlehem-Easton	Coplay Cement Mfg. Co.	-

State City	SMSA	Company (Including Divisions)	Capacity, Barrels/Year
PENNSYLVANIA (cont.)			
Egypt	Allentown-Bethlehem-Easton	Giant Portland Cement Co.	1,850,000
Evansville	Reading	Allentown Portland Cement Co., Sub. National Gypsum Co.	5,000,000
Fogelsville	Allentown-Bethlehem-Easton	Lehigh Portland Cement Co.	2,210,000
Nazareth	Allentown-Bethlehem-Easton	Lone Star Cement Corp.	3,600,000
Nazareth	Allentown-Bethlehem-Easton	Nazareth Cement Co.	2,400,000
Nazareth	Allentown-Bethlehem-Easton	Penn-Dixie Cement Corp.	1,840,000
Pittsburgh	Pittsburgh	Marquette Cement Mfg. Co.	2,000,000
Northampton	Philadelphia	Dragon Cement Co., Div. Martin-Marietta Corp.	2,000,000
Northampton	Philadelphia	Universal Atlas Cement Co., Div. U.S. Steel Corp.	2,900,000
Stockertown	Allentown-Bethlehem-Easton	Hercules Cement Co., Div. American Cement Corp.	3,500,000
Universal	Pittsburgh	Universal Atlas Cement Co., Div. U.S. Steel Corp.	2,600,000
Wampum	--	Medusa Portland Cement Co.	2,650,000
West Conshohocken	Philadelphia	Allentown Portland Cement Co., Sub. National Gypsum Co.	2,100,000
West Winfield	--	Penn-Dixie Cement Corp.	1,910,000
York	York	Medusa Portland Cement Co.	2,500,000
SOUTH CAROLINA			
Harleyville	--	Giant Portland Cement Co., Carolina Giant Div.	4,000,000
Holly Hill	--	Santee Portland Cement Corp.	2,000,000
SOUTH DAKOTA			
Rapid City	--	South Dakota Cement Plant	3,300,000
TENNESSEE			
Cowan	--	Marquette Cement Mfg. Co.	950,000

State City	SMSA	Company (Including Divisions)	Capacity, Barrels/Year
TENNESSEE (cont.)			
Kingsport	--	Penn-Dixie Cement Corp.	1,840,000
Knoxville	Knoxville	Ideal Basic Industries, Inc.	2,850,000
Nashville	Nashville	Marquette Cement Mfg. Co.	1,240,000
North Chattanooga	Chattanooga	General Portland Cement Co.	1,750,000
Richard City	--	Penn-Dixie Cement Corp.	1,620,000
TEXAS			
Amarillo	Amarillo	Southwestern Portland Cement Co.	1,200,000
Cementville	San Antonio	San Antonio Portland Cement Co.	2,500,000
Corpus Christi	Corpus Christi	Centex Construction Co.	1,400,000
Eagle Ford	Dallas	General Portland Cement Co.	3,650,000
El Paso	El Paso	Southwestern Portland Cement Co.	1,800,000
Fort Worth	Fort Worth	General Portland Cement Co.	4,000,000
Houston	Houston	Ideal Basic Industries, Inc.	3,500,000
Houston	Houston	General Portland Cement Co.	3,650,000
Houston	Houston	Lone Star Cement Corp.	3,300,000
Houston	Houston	Gulf Coast Portland Cement Co., Div. McDonough Co.	1,500,000
Maryneal	--	Lone Star Cement Corp.	2,900,000
Midlothian	Dallas	Texas Industries, Inc.	2,800,000
Midlothian	Dallas	Gifford-Hill & Co., Inc.	1,500,000
Odessa	Odessa	Southwestern Portland Cement Co.	1,350,000
Orange	Orange-Beaumont-Port Arthur	Texas Portland Cement Co., Div. Alpha Portland Cement Co.	2,000,000
Orange	--	Alpha Portland Cement Co.	2,400,000
San Antonio	San Antonio	Kaiser Cement & Gypsum Corp.	2,700,000

State City	SMSA	Company (Including Divisions)	Capacity, Barrels/Year
TEXAS (cont.)			
San Antonio	San Antonio	Capitol Aggregates, Inc.	1,000,000
Waco	Waco	Universal Atlas Cement Co., Div. U.S. Steel Corp.	2,000,000
UTAH			
Devil's Slide	--	Ideal Basic Industries, Inc.	1,900,000
Salt Lake City	Salt Lake City	Portland Cement Co. of Utah	1,000,000
VIRGINIA			
Lone Star	--	Lone Star Cement Corp.	3,500,000
Norfolk	Norfolk-Portsmouth	Lone Star Cement Corp.	2,300,000
WASHINGTON			
Bellingham	--	PPG Industries, Inc., Chemical Div.	1,900,000
Metaline Falls	--	Lehigh Portland Cement Co.	1,290,000
Seattle	Seattle-Everett	Lone Star Cement Corp.	1,300,000
Seattle	Seattle-Everett	Ideal Basic Industries, Inc.	2,500,000
WEST VIRGINIA			
Martinsburg	--	Capital Cement Co., Div. Martin-Marietta Corp.	5,200,000
WISCONSIN			
Manitowac	--	Medusa Portland Cement Co.	400,000
Milwaukee	Milwaukee	Marquette Cement Mfg. Co.	1,360,000
WYOMING			
Laramie	--	Monolith Portland Midwest Co.	1,100,000

F.4 Coal Cleaning Plants

The demand for cleaned coal has been steadily increasing; in 1952, 49 percent of production was cleaned, while in 1965 the proportion of a larger total was 65 percent.(5) There are 667 sites in 20 states(3,6) (see table F-5) where some cleaning operations are done.(3,6) Eighteen percent of these sites are in SMSA's. Use of coal is expected to continue growing at a projected rate of 4.8 percent per year through 1975.(7) Geographical distribution of the coal cleaning plants is shown on figure F-3.

Coal cleaning can be effected by a mechanical process (shaking tables or screens), by a pneumatic process (using air tables or using water or another aqueous solution as a cleaning medium), by washers, or by froth flotation. A fluid medium accomplishes both cleaning and rough sizing. Wet cyclones can also separate coal sizes coarsely as a preliminary step. Froth flotation separates the fines by carrying them away in a foam; then these can be recovered by filtration. Air cleaning, usually done on smaller sizes, makes simultaneous cleaning and separating possible.

Emissions from cleaning plants are due largely to handling, mechanical cleaning, and thermal drying operations. Centrifugal driers produce a sludge which is either carried off to a settling pond or filtered. Classifiers separate and partially dry the coal. Fluid bed driers move the coal over a plate where heated gases flow upward to perform the drying. In the flash type dryer, the wet coal is dropped into a stream of hot gases and carried into a cyclone to recover the dried coal. Primary emissions result from the dry steps in the cleaning-screening and the materials-handling processes.

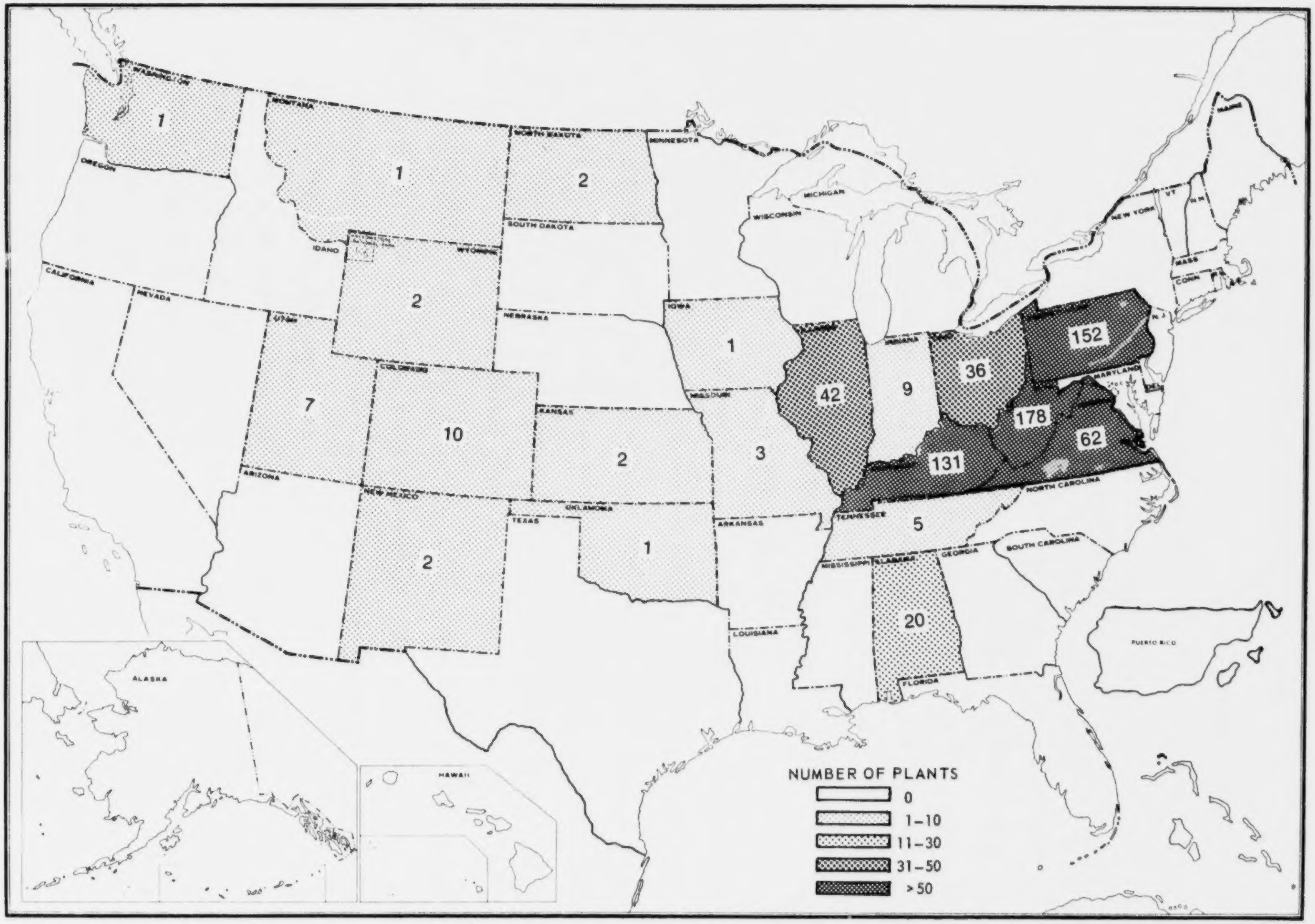
WASHINGTON
OREGON
CALIFORNIA
NEVADA
IDAHO
MONTANA
WYOMING
UTAH
COLORADO
ARIZONA
NEW MEXICO
NORTH DAKOTA
SOUTH DAKOTA
NEBRASKA
KANSAS
OKLAHOMA
TEXAS
MINNESOTA
IOWA
MISSOURI
ARKANSAS
LOUISIANA
WISCONSIN
MICHIGAN
INDIANA
TENNESSEE
MISSISSIPPI
ALABAMA
GEORGIA
FLORIDA
SOUTH CAROLINA
NORTH CAROLINA
MARYLAND
NEW YORK
VT
N H
MASS
CONN
ALASKA
HAWAII
PUERTO RICO
1
1
2
2
7
10
2
2
1
1
3
42
9
36
152
178
131
62
5
20
NUMBER OF PLANTS
0
1–10
11–30
31–50
>50

Figure F-3. Coal cleaning plants, 1967.

TABLE F-5. COAL CLEANING PLANTS
1968

State County	SMSA	Company	Capacity cleaned coal, thousands of tons per year
ALABAMA			
Jefferson	Birmingham	Alabama By-Products Corp.	200
Jefferson	Birmingham	Alabama By-Products Corp.	500
Jefferson	Birmingham	Alabama By-Products Corp.	856
Jefferson	Birmingham	Black Diamond Coal Mining	197
Jefferson	Birmingham	Peabody Coal Co.	900
Jefferson	Birmingham	Republic Steel Corp.	319
Jefferson	Birmingham	U.S. Pipe & Foundry	250
Jefferson	Birmingham	U.S. Pipe & Foundry	447
Jefferson	Birmingham	U.S. Steel Corp.	1,330
Jefferson	Birmingham	Woodard Iron Co.	560
Marion	--	Brilliant Coal Co.	122
Marion	--	Brookside-Pratt Mining Co.	38
Shelby	--	Southern Electric Co.	322
Walker	--	Alabama Power Co.	236
Walker	--	Bankhead Mining Co.	297
Walker	--	Marigold Coal Co.	130
Walker	--	McCoy Coal Co.	60
Walker	--	McCoy Coal Co.	18
Walker	--	Southern Electric Co.	962
Winston	--	McCoy Coal Co.	53

State County	SMSA	Company	Capacity cleaned coal, thousands of tons per year
COLORADO			
Fremont	--	W. D. Carley	53
Mesa	--	Juanita Coal & Coke Co.	60
Pitkin	--	Thompson Creek Coal & Coke	90
Routt	--	Energy Coal Co.	284
Routt	--	Pittsburgh & Midway Coal	42
Weld	--	Boulder Valley Coal Co.	75
Weld	--	Clayton Coal Co.	113
Weld	--	Clayton Coal Co.	76
Weld	--	Imperial Coal Co.	30
Weld	--	Imperial Coal Co.	174
ILLINOIS			
Christian	--	Peabody Coal Co.	3,857
Douglas	--	Bell & Zoller Coal Co.	446
Franklin	--	Freeman Coal Mining Co.	1,052
Franklin	--	Old Ben Coal Co.	1,139
Franklin	--	Old Ben Coal Co.	1,798
Fulton	--	Peabody Coal Co.	370
Fulton & Knox	--	Peabody Coal Co.	758
Fulton	--	Thunderbird Collieries Corp.	520
Fulton	--	Consolidated Coal, Truax-Trace Coal Div.	1,095
Fulton	--	Consolidated Coal, Truax-Trace Coal Div.	671

State County	SMSA	Company	Capacity cleaned coal, thousands of tons per year
ILLINOIS (cont.)			
Fulton	--	United Electric Coal Co.	1,388
Fulton	--	United Electric Coal Co.	636
Jefferson	--	Freeman Coal Mining Co.	1,889
Knox	--	Peabody Coal Co.	831
Macoupin	--	Little Dog Coal Co.	306
Montgomery	--	Freeman Coal Mining Co.	1,559
Peoria	Peoria	Peabody Coal Co.	334
Peoria	Peoria	United Electric Coal Co.	552
Peoria	Peoria	Pioneer Collieries Div., Sherwood-Templeton Coal Co.	81
Perry	--	Consolidated Coal, Truax-Trace Coal Div.	1,013
Perry	--	United Electric Coal Co.	1,420
Randolph	--	Southwestern Ill. Coal	1,085
Randolph	--	Southwestern Ill. Coal	3,547
Randolph	--	Consolidated Coal, Truax-Trace Coal Div.	940
Randolph	--	Ziegler Coal & Coke	564
Saline	--	Blue Bird Coal	-
Saline	--	Sahara Coal Co.	2,977
St. Clair	St. Louis	Belle-Valley Coal Co.	120
St. Clair	St. Louis	Peabody Coal Co.	3,304

State County	SMSA	Company	Capacity cleaned coal, thousands of tons per year
ILLINOIS (cont.)			
St. Clair	St. Louis	Peabody Coal Co.	869
Stark	--	Stonefort Coal Min. Co.	403
Vermillion	--	Ayrshire Collieries Corp.	531
Will & Kankakee	Chicago	Peabody Coal Co.	633
Williamson	--	Barbara-Kay Coal Corp.	64
Williamson	--	Bell & Zoller Coal Co.	732
Williamson	--	Freeman Coal Mining Co.	759
Williamson	--	Stonefort Coal Mining Co.	774
Williamson	--	Harrisburg Coal Co.	-
Williamson	--	Parton Coal Co.	31
Williamson	--	Peabody Coal Co.	296
Williamson	--	Peabody Coal Co.	356
Williamson	--	Thunderbird Collieries Corp.	537
INDIANA			
Clay	Terre Haute	Ayrshire Collieries Corp.	791
Gibson	--	Enos Coal Corp.	1,072
Gibson	--	Kings Station Coal Corp.	54
Pike	--	Enos Coal Corp.	979
Sullivan	Terre Haute	Ayrshire Collieries Corp.	1,078
Sullivan	Terre Haute	Thunderbird Collieries Corp.	858

State County	SMSA	Company	Capacity cleaned coal, thousands of tons per year
INDIANA (cont.)			
Vigo	Terre Haute	Peabody Coal Co.	320
Warrick	Evansville	Peabody Coal Co.	2,019
Warrick	Evansville	Peabody Coal Co.	1,605
IOWA			
Marion	--	Beard Coal Co.	89
KANSAS			
Cherokee	--	Pittsburg & Midway Coal	574
Crawford	--	Clemens Coal Co.	186
KENTUCKY			
Bell	--	Adventure Coal Co.	227
Bell	--	Bell Hi Coal Co.	240
Bell	--	Cardinal Gem Coal Co.	120
Bell	--	Coal Products, Inc.	130
Butler	--	Blair Fork Coal Co.	492
Butler	--	Williams Bros. Mining Co.	130
Clay	--	Claymont Coal Co.	-
Clay	--	Gemrose Coal Co.	195
Clay	--	Island Creek Coal Co.	1,006
Clay	--	Kentucky Mountain Coal Co.	49
Clay	--	New Big Creek Mining Co.	46
Clay	--	New Citation Coal Co.	195
Clay	--	Shamrock Coal Co.	243

State County	SMSA	Company	Capacity cleaned coal, thousands of tons per year
KENTUCKY (cont.)			
Cumberland	--	Kentucky Mountain Coal	55
Daviess	--	Green Coal Co.	709
Daviess	--	Morris Bros. Co.	130
Daviess	--	Morris Enterprises, Inc.	65
Estill	--	South-East Coal Co.	1,008
Floyd	--	Barbara Coal Co.	240
Floyd	--	Floyd Elkhorn Coal Co.	217
Floyd	--	Guaranty Mines	287
Floyd	--	Harold Fuel Co.	123
Floyd	--	Imperial Elkhorn Coal Co.	203
Floyd	--	Island Creek Coal Co.	59
Floyd	--	Island Creek Coal Co.	66
Floyd	--	Island Creek Coal Co.	2,111
Floyd	--	Johnson Elkhorn Coal Co.	133
Floyd	--	Kathryn Elkhorn Coal Co.	66
Floyd	--	Princess Coals, Inc.	552
Floyd	--	Princess Coals, Inc.	156
Floyd	--	Regal Elkhorn Coal Co.	46
Floyd	--	Stephens Elkhorn Fuel Co.	83
Floyd	--	Terry Elkhorn Coal Co.	233
Floyd	--	Turner Elkhorn Mining Co.	62

State County	SMSA	Company	Capacity cleaned coal, thousands of tons per year
KENTUCKY (cont.)			
Harlan	--	Childs Creek Coal Co.	260
Harlan	--	Clearbrook Coal Co.	1,160
Harlan	--	Crummies Harlan Coal Co.	765
Harlan	--	Grays Knob Coal Co.	145
Harlan	--	Harlan Collieries	80
Harlan	--	Harlan Fuel	147
Harlan	--	Harlan Hazard Sales	104
Harlan	--	International Harvester Co.	481
Harlan	--	King Darby Coal, Inc.	42
Harlan	--	Karst-Robbins Coal Co.	58
Harlan	--	Liggett Coal Corp.	130
Harlan	--	Pathfork-Harlan Coal Co.	130
Harlan	--	Pathfork-Harlan Coal Co.	200
Harlan	--	Preston Coal Co., Inc.	104
Harlan	--	Scotia Coal Co.	546
Harlan	--	Seagraves Coal Co.	103
Harlan	--	Shackleford Coal Co.	196
Harlan	--	Sigmon Construction Co.	260
Hopkins	--	Coiltown Mining Co.	1,100
Hopkins	--	Bell & Zoller Coal Co.	626
Hopkins	--	Island Creek Coal Co.	1,618
Hopkins	--	Island Creek Coal Co.	835

State County	SMSA	Company	Capacity cleaned coal, thousands of tons per year
KENTUCKY (cont.)			
Hopkins	--	Island Creek Coal Co.	180
Hopkins	--	Island Creek Coal Co.	744
Hopkins	--	Peabody Coal Co.	1,749
Hopkins	--	Pittsburgh & Midway Coal Mining	920
Hopkins	--	Rialto Coal Co., Inc.	336
Johnson	--	North East Coal Co.	110
Johnson	--	Warm Valley Coal Co.	-
Knott	--	Carr Creek Fuel Co.	300
Knox	--	Rocket Coal Co.	247
Knox	--	Royal Jellico Coal Co.	125
Leslie	--	Kentucky Mountain Coal Co.	35
Leslie	--	Mary Gail Coal Co.	325
Leslie	--	Smith Coal Co.	30
Letcher	--	Beth-Elkhorn Corp.	359
Letcher	--	Beth-Elkhorn Corp.	598
Letcher	--	Carolina Coal Sales	130
Letcher	--	Elkhorn & Jellico Coal Co.	218
Letcher	--	Gem Elkhorn Coal Co.	98
Letcher	--	Gem Elkhorn Coal Co.	260
Letcher	--	Kellann Coal Co.	130
Letcher	--	Klean Kole Co., Inc.	143
Letcher	--	Pine Valley Coal Co.	156
Letcher	--	Thornton Elkhorn Coal Co.	246

State County	SMSA	Company	Capacity cleaned coal, thousands of tons per year
KENTUCKY (cont.)			
Muhlenberg	--	Gibralter Coal Co.	1,437
Muhlenberg	--	Island Creek Coal Co.	675
Muhlenberg	--	Kirkpatrick Mining Co.	519
Muhlenberg	--	Peabody Coal Co.	2,598
Muhlenberg	--	Pittsburgh & Midway Coal	1,696
Muhlenberg	--	Wright Coal Co.	354
Ohio	--	Peabody Coal Co.	1,687
Ohio	--	Peabody Coal Co.	400
Perry	--	Ashlo Coal Co.	200
Perry	--	Blue Diamond Coal Co.	603
Perry	--	Eas Coal Co.	163
Perry	--	Ecco Mining	146
Perry	--	Kenmont Coals, Inc.	-
Perry	--	Kentucky Oak Mining	-
Perry	--	Kodak Mining Co.	349
Perry	--	Kodak Mining Co.	266
Perry	--	Pratt Brothers Coal Co.	195
Perry	--	Perrone Productions Co.	3,600
Perry	--	Sunfire Coal Co.	182
Perry	--	Wisconsin Processing Co.	103
Perry	--	Whitaker Coal Corp.	150

State County	SMSA	Company	Capacity cleaned coal, thousands of tons per year
KENTUCKY (cont.)			
Pike	--	Allbain Coal Co.	71
Pike	--	Allbain Coal Co.	16
Pike	--	Beth-Elkhorn Corp.	-
Pike	--	Big Six Coal Corp.	39
Pike	--	Central Quality Coal Co.	320
Pike	--	Clintwood Coal Co.	147
Pike	--	Citation Coal Co.	300
Pike	--	Douglas Coal Co.	200
Pike	--	Eastern Coal Co.	888
Pike	--	Feds Creek Coal Co.	299
Pike	--	Flanary Coal & Land Co.	270
Pike	--	Gabriel Valley Enterprises	-
Pike	--	Kay-Cee Coal Co.	85
Pike	--	Kentland-Elkhorn Coal Corp.	774
Pike	--	Kentucky Carbon Corp.	522
Pike	--	Knox Turkey Creek Coal Co.	78
Pike	--	Kinney Elkhorn Coal Co.	130
Pike	--	Little Lump Coal Co.	130
Pike	--	Loftis Coal Co.	130
Pike	--	Osborne Mining Corp.	260
Pike	--	Phelps Collieries Co., Inc.	-
Pike	--	Republic Steel Corp.	579
Pike	--	Russel Fork Coal Co., Inc.	900
Pike	--	Utilities Esco Coal Co.	600

State County	SMSA	Company	Capacity cleaned coal, thousands of tons per year
KENTUCKY (cont.)			
Pike	--	Wolfe Creek Collieries Co.	191
Union	--	Island Creek Coal Co.	998
Union	--	Pittsburgh & Midway Coal	963
Union	--	Pittsburgh & Midway Coal	1,232
Weirs Creek	--	Island Creek Coal Co.	355
Whitley	--	Kentucky-Knox Mining	81
Whitley	--	U.S. Steel Corp.	-
MISSOURI			
Boone	--	Peabody Coal Co.	445
Henry	--	Peabody Coal Co.	274
Macon	--	Peabody Coal Co.	633
MONTANA			
Carbon	--	Brophy Coal Co.	18
NEW MEXICO			
Colfax	--	Kaiser Steel Co.	192
McKinley	--	Pittsburgh & Midway Coal	231
NORTH DAKOTA			
Divide	--	Baukol Neonon, Inc.	283
Mercer	--	Knife River Coal Mining	322

State County	SMSA	Company	Capacity cleaned coal, thousands of tons per year
OHIO			
Athens	--	Peabody Coal Co.	410
Belmont	Wheeling	Clean Coal Co.	75
Belmont	Wheeling	Cravat Coal Co.	218
Belmont	Wheeling	Flushing Coal Co.	123
Belmont	Wheeling	North American Coal Co.	1,209
Belmont	Wheeling	North American Coal Co.	1,214
Belmont	Wheeling	North American Coal Co.	310
Belmont	Wheeling	Oglebay Norton Co.	560
Belmont	Wheeling	Oglebay Norton Co.	612
Belmont	Wheeling	Speidel Fuel Corp.	205
Carroll	--	Puskarich Mining, Inc.	50
Carroll	--	Whitaker Coal Co.	82
Columbiana	--	R & W Coal Co.	29
Coshocton	--	Masons & Sons Coal Co., Inc.	50
Gallia	--	Peacock Coal Co.	37
Guernsey	--	C V & W Coal Co., Inc.	97
Harrison	--	Consolidation Coal Co.	3,309
Harrison	--	Island Creek Coal Co.	-
Harrison	--	Youghiogheny & Ohio Coal Co.	921
Holmes	--	Blue Crystal Miner's, Inc.	83
Jackson	--	Sands Hill Coal Co.	53
Jackson	--	Waterloo Coal Co., Inc.	147
Jefferson	Steubenville-Weirton	Consolidation Coal Co.	895
Jefferson	Steubenville-Weirton	Jefferson County Coal Co.	147

State County	SMSA	Company	Capacity cleaned coal, thousands of tons per year
OHIO (cont.)			
Jefferson	Steubenville-Weirton	North American Coal Corp.	530
Jefferson	Steubenville-Weirton	P & W Mining Co.	44
Lawrence	Huntington Ashland	Collins Mining Co.	205
Morgan	--	Central Ohio Coal Co.	1,166
Noble	--	Central Ohio Coal Co.	1,008
Perry	--	Peabody Coal Co.	1,289
Perry	--	Sidwell Bros. Co.	70
Stark	Canton	Mullet Coal Co.	132
Tuscarawas	--	Alexander Bros., Inc.	28
Tuscarawas	--	Alraydon Mining, Inc.	80
Tuscarawas	--	Eberhart Coal Co.	59
Tuscarawas	--	J & M Mining Co.	194
OKLAHOMA			
Haskell	--	Evans Coal Co.	96
PENNSYLVANIA			
Allegheny	Pittsburgh	Aloe Coal Co.	416
Allegheny	Pittsburgh	Consolidation Coal Co.	2,178
Allegheny	Pittsburgh	Consolidation Coals, Inc.	-
Allegheny	Pittsburgh	Wildwood Coal Co.	347
Allegheny	Pittsburgh	Republic Steel Corp.	507
Armstrong	--	Allegheny River Mining Co.	146
Armstrong	--	Altmire Bros. Coal Co., Inc.	64

State County	SMSA	Company	Capacity cleaned coal, thousands of tons per year
PENNSYLVANIA (cont.)			
Armstrong	--	Carpentertown Coal & Coke Co.	195
Armstrong	--	Edmon Coal Co.	22
Armstrong	--	Leechburgh Mining Co.	365
Armstrong	--	Powell Coal Co.	32
Armstrong	--	Rochester & Pittsburgh Coal	657
Armstrong	--	United Industries, Inc.	157
Bedford	--	PBS Coals, Inc.	-
Butler	--	Allison Engineering Co.	96
Butler	--	Amos Coal Corp.	114
Butler	--	Dorr Oliver	5,760
Butler	--	Eagal Coal Co.	30
Butler	--	Sunbeam Coal Corp.	173
Butler	--	Tri-County Fuel Co.	259
Butler	--	Union Carbide Corp.	295
Cambria	Johnstown	Bethlehem Mines Corp.	1,632
Cambria	Johnstown	Bethlehem Mines Corp.	2,274
Cambria	Johnstown	Bethlehem Mines Corp.	218
Cambria	Johnstown	Barnes & Tucker Co.	1,000
Cambria	Johnstown	Barnes & Tucker Co.	810
Cambria	Johnstown	Benjamin Coal Co.	400
Cambria	Johnstown	Benjamin Coal Co.	400
Cambria	Johnstown	Coal Enterprises, Inc.	32

State County	SMSA	Company	Capacity cleaned coal, thousands of tons per year
PENNSYLVANIA (cont.)			
Cambria	Johnstown	Cooney Bros. Coal Co.	147
Cambria	Johnstown	Eastern Association Coal	498
Cambria	Johnstown	Jandy Coal Co., Inc.	110
Cambria	Johnstown	Johnstown Coal & Coke	76
Cambria	Johnstown	Meehan Co.	130
Cambria	Johnstown	Pennsylvania Coal & Coke	435
Carbon	--	Bliss & Sons, Inc.	14
Carbon	--	Honey Brook Mines, Inc.	138
Centre	--	Elliot Coal Mining Co.	478
Centre	--	R. S. Carlin, Inc.	162
Clarion	--	Allison Engineering Co.	330
Clarion	--	C & K Co.	585
Clarion	--	E. C. Dean Contractor, Inc.	131
Clarion	--	P. Weaver & Sons	142
Clarion	--	Zacherl Coal Co., Inc.	207
Clearfield	--	Bradford Coal Co., Inc.	427
Clearfield	--	M. Brown Co.	72
Clearfield	--	Commos Coal Mining Co.	75
Clearfield	--	New Shawmut Mining Co.	390
Clearfield	--	Oak Grove Coal Co.	325
Columbia	--	Jeddo-Highland Coal Co.	-
Dauphin	Harrisburg	Kerrigan Coals, Inc.	30

State County	SMSA	Company	Capacity cleaned coal, thousands of tons per year
PENNSYLVANIA (cont.)			
Elk	--	New Shawmut Mining Co.	130
Fayette	--	Bortz Coal Co.	104
Fayette	--	Jones & Laughlin Steel Corp.	4,977
Fayette	--	National Mines Corp.	629
Greene	--	Buckeye Coal Co.	734
Greene	--	Duquesne Light Co.	1,482
Greene	--	U.S. Steel Corp.	2,426
Indiana	--	Appalachia Coal Co.	79
Indiana	--	Armagh Coal Co., Inc.	92
Indiana	--	Crichton Coal & Coke Co.	367
Indiana	--	Friel-Marshall Coal Mining	260
Indiana	--	Glen-Irvan Corp.	129
Indiana	--	Harman Coal Co.	1,131
Indiana	--	Homer City Coal Co.	16
Indiana	--	Imperial Coal Corp.	180
Indiana	--	Imperial Coal Corp.	506
Indiana	--	Imperial Coal Corp.	115
Indiana	--	Imperial Coal Corp.	19
Indiana	--	James Coal Mining Co.	254
Indiana	--	Rochester & Pittsburgh Coal	603
Indiana	--	Tunnelton Mining Co.	253
Indiana	--	Valley Coal Co.	80

State County	SMSA	Company	Capacity cleaned coal, thousands of tons per year
PENNSYLVANIA (cont.)			
Jefferson	--	Allegheny River Mining Co.	399
Jefferson	--	Doverspike Bros. Coal Co.	197
Jefferson	--	Minns Coal Co.	147
Jefferson	--	W. P. Stahlman Coal Co.	385
Lackawanna	Scranton	Ace Coal Co.	26
Lackawanna	Scranton	De Angelis Supreme Anthr., Inc.	130
Lackawanna	Scranton	Diamond Coal	260
Lackawanna	Scranton	Pompey Coal Co.	340
Lackawanna	Scranton	Raymond Colliery Co.	182
Lackawanna	Scranton	Waddell Coal Mining Co., Inc.	69
Luzerne	Wilkes-Barre-Hazleton	Blue Coal Corp.	1,413
Luzerne	Wilkes-Barre-Hazleton	Jeddo-Highland Coal Co.	480
Luzerne	Wilkes-Barre-Hazleton	Jeddo-Highland Coal Co.	-
Luzerne	Wilkes-Barre-Hazleton	Lehigh Valley Anthr., Inc.	994
Luzerne	Wilkes-Barre-Hazleton	Lehigh Valley Anthr., Inc.	Incl. w/above
Luzerne	Wilkes-Barre-Hazleton	Lehigh Valley Anthr., Inc.	Incl. w/above
Luzerne	Wilkes-Barre-Hazleton	Gowen	23
Luzerne	Wilkes-Barre-Hazleton	Susquehenna Coal Co.	343
Mercer	--	Perry Ross Coal Co.	130
Mercer	--	Testa Bros., Inc.	72
Northumberland	--	Reading Anthracite Co.	-
Northumberland	--	Reidinger Coal Service	46
Northumberland	--	Rosini Coal Co.	130
Schuylkill	--	Anthracite Fine Coals, Inc.	-

State County	SMSA	Company	Capacity cleaned coal, thousands of tons per year
PENNSYLVANIA (cont.)			
Schuylkill	--	B & D Mining	80
Schuylkill	--	Beaverbrook Coal Co.	-
Schuylkill	--	Cass Construction Co.	59
Schuylkill	--	Collin Coal Co.	65
Schuylkill	--	Film Coal Co., Inc.	91
Schuylkill	--	Gilberton Coal Co.	294
Schuylkill	--	Greenwood Mining Co.	614
Schuylkill	--	Hegins Mixing Co.	42
Schuylkill	--	J & E Coal Co.	62
Schuylkill	--	K M & F Coal Co.	65
Schuylkill	--	Kocher Coal Co.	65
Schuylkill	--	Legal Coal Co.	180
Schuylkill	--	Lehigh Valley Anthr., Inc.	Incl. w/Luzerne co. plants
Schuylkill	--	Lehigh Valley Anthr., Inc.	Incl. w/Luzerne co. plants
Schuylkill	--	Locust Valley Coal Co.	200
Schuylkill	--	Live Oak Coal Co.	-
Schuylkill	--	Manbeck Dredging Co.	60
Schuylkill	--	Manbeck Dredging Co.	70
Schuylkill	--	Manbeck Dredging Co.	80
Schuylkill	--	Maple Spring Coal Co.	160

State County	SMSA	Company	Capacity cleaned coal, thousands of tons per year
PENNSYLVANIA (cont.)			
Schuylkill	--	Parkway Anthracite Inc.	21
Schuylkill	--	Phoenix Contracting Co.	104
Schuylkill	--	Pine Creek Coal Co.	58
Schuylkill	--	Reading Anthracite Co.	-
Schuylkill	--	Reading Anthracite Co.	-
Schuylkill	--	Schneik Coal Co.	-
Schuylkill	--	Skytop Coal Co., Inc.	91
Schuylkill	--	Starwood Coal Corp.	27
Schuylkill	--	Swatara Coal Co.	102
Schuylkill	--	Underkoffler Coal Co.	65
Somerset	Johnstown	Alumbaugh Coal Co., Inc.	73
Somerset	Johnstown	Brid Coal Co.	800
Somerset	Johnstown	Denise Coal Co.	123
Somerset	Johnstown	Fetterolf Coal Co.	366
Somerset	Johnstown	Manor Hill Coal Co.	34
Somerset	Johnstown	Pine Hill Smokeless Coal Co.	9
Somerset	Johnstown	Ponfeigh Smokeless Coal Co.	151
Somerset	Johnstown	Ralphton Coal Co.	56
Somerset	Johnstown	Reitz Coal Co.	125
Somerset	Johnstown	Solar Fuel Co.	233

State County	SMSA	Company	Capacity cleaned coal, thousands of tons per year
PENNSYLVANIA (cont.)			
Washington	Pittsburgh	Bethlehem Mines Corp.	610
Washington	Pittsburgh	Bethlehem Mines Corp.	837
Washington	Pittsburgh	Bethlehem Mines Corp.	778
Washington	Pittsburgh	Mathies Coal Co.	1,479
Washington	Pittsburgh	Republic Steel Corp.	655
Washington	Pittsburgh	U.S. Steel Corp.	1,925
Westmoreland	Pittsburgh	Canterbury Coal Co.	361
Westmoreland	Pittsburgh	Consolidation Coal Co.	469
Westmoreland	Pittsburgh	Eastern Associated Coal Corp.	464
Westmoreland	Pittsburgh	F & E Coal Co.	1,920
Westmoreland	Pittsburgh	Florence Minting	1,600
Westmoreland	Pittsburgh	Jamison Coal Co.	298
Westmoreland	Pittsburgh	North American Coal Corp.	520
Westmoreland	Pittsburgh	North American Coal Corp.	209
Westmoreland	Pittsburgh	Republic Steel Corp.	817
TENNESSEE			
Anderson	Knoxville	Consolidation Coal Co.	405
Claiborne	--	Dixie Pine Mining Co., Inc.	23
Claiborne	--	Kopper Glo Fuels, Inc.	82
Claiborne	--	Marthann Coal Co., Inc.	52
Marion	--	Grundy Mining Co.	103

State County	SMSA	Company	Capacity cleaned coal, thousands of tons per year
UTAH			
Carbon	--	Carbon Fuel Corp.	153
Carbon	--	Independent Coal & Coke Co.	485
Carbon	--	Kaiser Steel Corp.	1,213
Carbon	--	Spring Canyon Coal Co.	202
Carbon	--	United States Fuel Co.	432
Carbon	--	U.S. Steel Corp.	1,048
Emery	--	American Fuel Co.	30
VIRGINIA			
Buchanan	--	Anchor Smokeless Coal Co.	65
Buchanan	--	Bear Branch Coal Co.	129
Buchanan	--	Beatrice Pocahontas Co.	1,240
Buchanan	--	Briar Coal Co.	-
Buchanan	--	Buchanan County Coal Corp.	455
Buchanan	--	Cambridge Smokeless Coal Co.	161
Buchanan	--	Clifton Fork Coal Co.	112
Buchanan	--	Dawn Mining Co., Inc.	55
Buchanan	--	Diamond Smokeless Coal Corp.	52
Buchanan	--	Home Creek Smokeless Coal Co.	98
Buchanan	--	Island Creek Coal Co.	1,300
Buchanan	--	Jackson Fuel Corp.	195
Buchanan	--	Jewell Ridge Coal Corp.	305
Buchanan	--	Jewell Ridge Coal Corp.	211

State County	SMSA	Company	Capacity cleaned coal, thousands of tons per year
VIRGINIA (cont.)			
Buchanan	--	Jewell Ridge Coal Corp.	166
Buchanan	--	Jewell Ridge Coal Corp.	388
Buchanan	--	Leetown Coal Co.	221
Buchanan	--	Leetown Coal Co.	420
Buchanan	--	Leetown Coal Co.	-
Buchanan	--	Lester Coal Co., Inc.	436
Buchanan	--	Little Bear Coal Corp.	120
Buchanan	--	Little Buddy Coal Corp.	195
Buchanan	--	Margaret Ann Coal Co.	198
Buchanan	--	Oakwood Red Ash Coal Corp.	260
Buchanan	--	Paragon Jewel Coal Co., Inc.	205
Buchanan	--	Patterson Coal Co.	104
Buchanan	--	Quality Coal Co.	98
Buchanan	--	Southwestern Virginia Coal	301
Buchanan	--	Universal Coal Co., Inc.	150
Buchanan	--	Vansant Coal Corp.	174
Buchanan	--	Virginia By-Products Coal Co.	90
Dickenson	--	Banner Splashdam Coal Co., Inc.	45
Dickenson	--	Clinchfield Coal	980
Dickenson	--	Cumberland Colliery	195
Dickenson	--	Edith Fay Coal Corp.	189
Dickenson	--	Harmon Mining Corp.	369
Dickenson	--	Lambert Coal Co.	176

State County	SMSA	Company	Capacity cleaned coal, thousands of tons per year
VIRGINIA (cont.)			
Lee	--	Jeb Pocahontas Coal Co., Inc.	195
Lee	--	Lee-Darby Coal Corp.	65
Lee	--	Virginia-Lee Co., Inc.	33
Montgomery	--	Virginia Anthracite Coal	-
Russell	--	Bostic Coal Co.	46
Russell	--	Clinchfield Coal	3,474
Russell	--	Clinchfield Coal	885
Russell	--	Holston Corp.	73
Russell	--	Keen & Runyon Coal Co.	60
Tazewell	--	New Garden Coal Corp.	211
Tazewell	--	Norma Mining Corp.	50
Tazewell	--	Raven Smokeless Coal Co.	109
Wise	--	Coal Processing Corp.	385
Wise	--	Norton Coal Co.	133
Wise	--	Virginia Iron Coal & Coke	263
Wise	--	Virginia Iron Coal & Coke	412
Wise	--	Virginia Iron Coal & Coke	383
Wise	--	Westmoreland Coal Co.	122
Wise	--	Westmoreland Coal Co.	363
Wise	--	Westmoreland Coal Co.	114
Wise	--	Westmoreland Coal Co.	480
Wise	--	Westmoreland Coal Co.	458
Wise	--	Westmoreland Coal Co.	286
Wise	--	Westmoreland Coal Co.	502
Wise	--	Wharton Coal Co.	4

State County	SMSA	Company	Capacity cleaned coal, thousands of tons per year
WASHINGTON			
King	Seattle-Everett	Palmer Coking Coal Co., Inc.	6
WEST VIRGINIA			
Barbour	--	Badger Coal Co., Inc.	512
Barbour	--	Badger Coal Co., Inc.	33
Barbour	--	Bethlehem Mines	344
Barbour	--	Grafton Coal Co.	522
Barbour	--	Mineral Coal Co., Inc., of W. Va.	69
Barbour	--	Tygart Coal & Coke Co.	156
Boone	--	Armco Steel Co.	1,054
Boone	--	Kessler Coals, Inc.	49
Boone	--	Spruce River Coal Co.	468
Boone	--	Youghiogheny & Ohio Coal Co.	505
Brooke	Steubenville-Weirton	Windsor Power House Coal Co.	408
Fayette	--	Ames Mining Co.	156
Fayette	--	Beards Fork Coal Mining Corp.	304
Fayette	--	Branch Fuel Co.	33
Fayette	--	Cannelton Coal Co.	1,339
Fayette	--	Clifton's Smokeless Coal	585
Fayette	--	Milburn Colliery Co.	206
Fayette	--	The New River Co.	287
Fayette	--	The New River Co.	132
Fayette	--	The New River Co.	242
Fayette	--	Semet-Solvay Div., Allied Chem.	768
Fayette	--	Smith Coal Co.	221

State County	SMSA	Company	Capacity cleaned coal, thousands of tons per year
WEST VIRGINIA (cont.)			
Gilmer	--	Rochester & Pittsburgh Coal	407
Grant	--	Alpine Coal Co.	780
Grant	--	North Branch Coal Co.	2,000
Greenbrier	--	G B's Coal Mine, Inc.	-
Greenbrier	--	Jet Jewell Mining Co.	65
Greenbrier	--	Leckie Smokeless Coal Co.	400
Harrison	--	Baldy Coal, Inc.	130
Harrison	--	Consolidation Coal Co.	635
Harrison	--	Clinchfield Coal Co.	623
Harrison	--	Clinchfield Coal Co.	594
Harrison	--	Galloway Land Co.	461
Harrison	--	La Rosa Fuel Co., Inc.	323
Harrison	--	McCandlish Coal Corp.	156
Harrison	--	Ohio Mining	32
Harrison	--	Petitto Brother	43
Kanawha	Charleston	The Carbon Fuel Co.	192
Kanawha	Charleston	The Carbon Fuel Co.	1,877
Kanawha	Charleston	The Carbon Fuel Co.	806
Kanawha	Charleston	Central Appalachian Coal Co.	422
Kanawha	Charleston	Kelley's Creek Coal Co.	118
Kanawha	Charleston	Hanna Coal Co.	689
Kanawha	Charleston	Imperial Colliery Co.	324
Kanawha	Charleston	Imperial Colliery Co.	222

State County	SMSA	Company	Capacity cleaned coal, thousands of tons per year
WEST VIRGINIA (cont.)			
Kanawha	Charleston	Oglebay Norton Co.	1,400
Kanawha	Charleston	Union Carbide Corp.	465
Kanawha	Charleston	Union Carbide Corp.	542
Kanawha	Charleston	Valley Camp Coal Co.	200
Kanawha	Charleston	Valley Camp Coal Co.	1,558
Logan	--	Amherst Coal Co.	1,915
Logan	--	Amherst Coal Co.	1,733
Logan	--	Boone County Coal Corp.	1,550
Logan	--	Buffalo Mining Co.	409
Logan	--	Crystal Block Coal & Coke	140
Logan	--	Island Creek Coal Co.	1,537
Logan	--	Island Creek Coal Co.	518
Logan	--	Island Creek Coal Co.	1,335
Logan	--	Island Creek Coal Co.	256
Logan	--	Island Creek Coal Co.	747
Logan	--	Omar Mining Co.	2,160
Logan	--	Princess Coals, Inc.	455
Logan	--	Princess Coals, Inc.	260
Logan	--	Princess Coals, Inc.	130
Logan	--	Raleigh Eagle Coal Co.	215
Logan	--	Snap Creek Coal Co.	195
Logan	--	National Coal Mining Co.	495
Logan	--	Westmoreland Coal Co.	889
Logan	--	Westmoreland Coal Co.	889
Logan	--	Youngstown Mines Corp.	476

State County	SMSA	Company	Capacity cleaned coal, thousands of tons per year
WEST VIRGINIA (cont.)			
Marion	--	Bethlehem Mines	931
Marion	--	Bethlehem Mines	1,198
Marion	--	Consolidation Coal Co.	540
Marion	--	Consolidation Coal Co.	921
Marion	--	Consolidation Coal Co.	1,764
Marion	--	Consolidation Coal Co.	1,305
Marion	--	Joanne Coal Co.	726
Marion	--	Rochester & Pittsburgh Coal	889
Marshall	Wheeling	Consolidation Coal Co.	1,396
Marshall	Wheeling	Valley Camp Coal Co.	516
McDowell	--	Ashland Mining Corp.	153
McDowell	--	Bishop Coal Co.	1,235
McDowell	--	Cannelton Coal Co.	600
McDowell	--	Consolidation Coal Co.	468
McDowell	--	Consolidation Coal Co.	159
McDowell	--	Consolidation Coal Co.	478
McDowell	--	Darr Red Ash Coal Co.	54
McDowell	--	Indian Pocahontas Coal Corp.	138
McDowell	--	Island Creek Coal Co.	340
McDowell	--	Island Creek Coal Co.	267
McDowell	--	Olga Coal Co.	1,676

State County	SMSA	Company	Capacity cleaned coal, thousands of tons per year
WEST VIRGINIA (cont.)			
McDowell	--	Peter White Coal Mining Co.	218
McDowell	--	Pocahontas Empire Coal Corp.	273
McDowell	--	Pocahontas Empire Coal Corp.	201
McDowell	--	The Pocahontas Red Ash Mining	370
McDowell	--	Pocahontas Red Bird Coal Co.	195
McDowell	--	Royalty Smokeless Coal Co.	363
McDowell	--	United Pocahontas Coal Co.	574
McDowell	--	United Pocahontas Coal Co.	319
McDowell	--	U.S. Steel Corp.	3,903
McDowell	--	Pais Pocahontas Coal Corp.	130
Mercer	--	Consolidation Coal Co.	443
Mercer	--	Consolidation Coal Co.	362
Mercer	--	Kietchekan Pocahontas Coal	150
Mineral	--	Masteller Coal Co.	87
Mingo	--	Burning Creek Fuel Corp.	83
Mingo	--	Big Eagle Coal	26
Mingo	--	Crystal Block Coal & Coke	240
Mingo	--	Dash Coal	128
Mingo	--	Island Creek Coal Co.	374
Mingo	--	Island Creek Coal Co.	200
Mingo	--	Island Creek Coal Co.	546

State County	SMSA	Company	Capacity cleaned coal, thousands of tons per year
WEST VIRGINIA (cont.)			
Mingo	--	Matewan Coal Sales Agency, Inc.	33
Mingo	--	National Coal Mining Co.	911
Mingo	--	North Atlantic Coal Corp.	183
Monongalia	--	Consolidation Coal	312
Monongalia	--	Consolidation Coal	3,737
Monongalia	--	National Coals, Inc.	304
Monongalia	--	South Union Coal Co.	338
Nicholas	--	Birch Coal Co.	1,040
Nicholas	--	Gauley Coal And Coke Co.	-
Nicholas	--	Gauley Coal And Coke Co.	585
Nicholas	--	Gauley Coal And Coke Co.	1,300
Nicholas	--	Hayes Coal Co., Inc.	54
Nicholas	--	Imperial Smokeless Coal	1,200
Nicholas	--	Johnstown Coal & Coke Co.	498
Nicholas	--	Peerless Eagle Coal Co.	435
Nicholas	--	Sewell Coal Co.	650
Nicholas	--	Summerville Coal Co.	2,000
Nicholas	--	Summerville Coal Co.	1,300
Ohio	Wheeling	Valley Camp Coal Co.	199
Ohio	Wheeling	Valley Camp Coal Co.	968
Pocahontas	--	Cherry Rive Coal & Coke	700

State County	SMSA	Company	Capacity cleaned coal, thousands of tons per year
WEST VIRGINIA (cont.)			
Preston	--	Chapel Coal Co.	900
Preston	--	Mart Coal Co.	104
Preston	--	Kingwood Mining Co.	303
Preston	--	PBS Coals, Inc.	260
Raleigh	--	Amigo Smokeless Coal Co.	218
Raleigh	--	Armco Steel Corp.	92
Raleigh	--	Meadows Coal Co.	16
Raleigh	--	Raleigh Empire Coal Corp.	136
Raleigh	--	The New River Co.	267
Raleigh	--	The New River Co.	48
Raleigh	--	Slab Fork Coal Co.	1,158
Raleigh	--	Smith & Stoney Coal Co.	77
Raleigh	--	Sterling Smokeless Coal Co.	543
Raleigh	--	Winding Gulf Coals, Inc.	372
Raleigh	--	Winding Gulf Coals, Inc.	312
Raleigh	--	Winding Gulf Coals, Inc.	294
Raleigh	--	Winding Gulf Coals, Inc.	521
Raleigh	--	Winding Gulf Coals, Inc.	369
Raleigh	--	Winding Gulf Coals, Inc.	321
Randolph	--	Ames Coal Co.	390
Randolph	--	Howell Sewell Coal Co.	90

State County	SMSA	Company	Capacity cleaned coal, thousands of tons per year
WEST VIRGINIA (cont.)			
Randolph	--	The Roaring Creek Coal Co.	108
Taylor	--	Mason Bros. Coal Co.	65
Upshur	--	Upshur Coals, Ltd.	191
Upshur	--	Minear Coal Co., Inc.	156
Wayne	Huntington-Ashland	Oglebay Norton Co.	1,600
Webster	--	D & C Mining Co., Inc.	64
Webster	--	Johnstown Coal & Coke Co.	126
Webster	--	Spring Ridge Coal Co.	104
Webster	--	Spring Ridge Coal Co.	54
Webster	--	Sugar Creek Corp.	280
Wyoming	--	Amigo Smokeless Coal Co.	455
Wyoming	--	Consolidation Coal Co.	212
Wyoming	--	Consolidation Coal Co.	504
Wyoming	--	Island Creek Coal Co.	449
Wyoming	--	Island Creek Coal Co.	671
Wyoming	--	Itmann Coal Co.	1,882
Wyoming	--	Oglebay Norton Co.	93
Wyoming	--	Ranger Fuel Corp.	1,600
Wyoming	--	Rawl Sales & Processing Co.	172
Wyoming	--	Robinson-Phillisp Coal Co.	195
Wyoming	--	Robinson-Phillisp Coal Co.	260
Wyoming	--	Semet-Solvay Div., Allied Chem.	686

State County	SMSA	Company	Capacity cleaned coal, thousands of tons per year
WEST VIRGINIA (cont.)			
Wyoming	--	Slab Fork Coal Co.	452
Wyoming	--	Winding Gulf Coals, Inc.	382
Lincoln	--	Gunn-Quealy Coal Co.	77
Lincoln	--	Kemmerer Coal Co.	124

F.5 Coke (By-Product)

Nearly all coke used in metallurgical operations is produced in by-product ovens. Currently the antiquated beehive coke oven provides slightly more than 1 percent of total coke output. Because sulfur has an undesirable effect in steelmaking, low sulfur coal is used for coke manufacturing.

By-product coke plants are located predominantly in the ironmaking and steelmaking centers of the country. There are 6 plants in the Chicago, Illinois, Northwestern Indiana Standard Consolidated Area, 8 in the Pittsburgh SMSA, and 4 each in Youngstown-Warren and Birmingham SMSA's. Of the 65 active plants(3) (see table F-6), only 3 are outside SMSA's.

Coke plant capacities range from less than 500 tons to over 5,000 tons per day with production in by-product ovens amounting to 63,775,000 tons and in beehive ovens 806,000 tons produced in 1967.(4) A map depicting the distribution of by-product plants is shown in figure F-4. The number of beehive coke plants dropped from 21 in December 1965 to 15 plants in December 1966; 7 are in Pennsylvania, 6 in Virginia, and one each in Kentucky and West Virginia.(8)

A by-product plant consists of a battery of long, narrow firebrick ovens separated by combustion chambers. The fuel used in the chambers may be blast furnace gas, coke oven gas, or natural gas. Crushed and sized coal is introduced into the red hot ovens through charging holes on top of the battery. This operation allows smoke, dust, hydrogen sulfide, phenols, carbon monoxide, ammonia, methane, ethane, and many other organic compounds to escape to the atmosphere. Losses occur

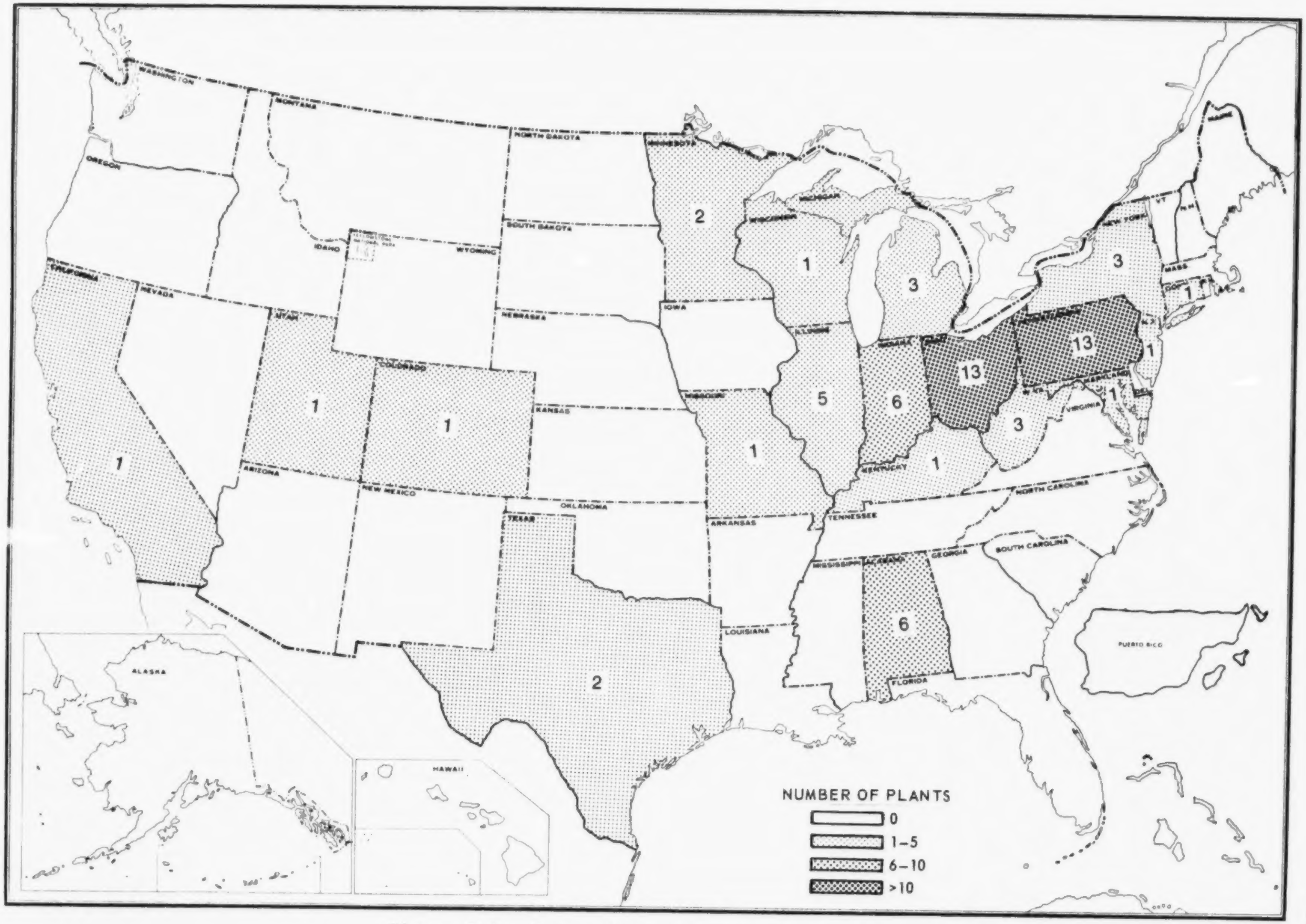
WASHINGTON
OREGON
CALIFORNIA
1
NEVADA
IDAHO
MONTANA
WYOMING
UTAH
1
COLORADO
1
ARIZONA
NEW MEXICO
NORTH DAKOTA
SOUTH DAKOTA
NEBRASKA
KANSAS
OKLAHOMA
TEXAS
2
MINNESOTA
2
IOWA
MISSOURI
1
ARKANSAS
LOUISIANA
WISCONSIN
1
ILLINOIS
5
MICHIGAN
3
INDIANA
6
OHIO
13
KENTUCKY
1
TENNESSEE
MISSISSIPPI
ALABAMA
6
GEORGIA
FLORIDA
SOUTH CAROLINA
NORTH CAROLINA
VIRGINIA
3
PENNSYLVANIA
13
NEW YORK
3
1
1
1
VT
N.H.
MAINE
MASS
CONN
PUERTO RICO
ALASKA
HAWAII
NUMBER OF PLANTS
0
1–5
6–10
>10

Figure F-4. By-product coke oven plants, 1967.

as well when discharging the oven and also through leaking oven doors during the carburization cycle. Since the ovens in a battery are sequentially operated, the pollutants are discharged at a fairly constant rate. Except for those escaping to the atmosphere, most of the gases produced during carburization are processed in a by-product coke plant where tar, ammonia, ammonium sulfate, benzol, toluol, xylol, etc., may be extracted. The remaining gas, having a medium heating value, is used in boilers or furnaces, including those of the coke oven.

After the incandescent coke is pushed from the oven into a quenching type rail car, burning in air occurs. The car is conveyed to a quench tower where huge quantities of water are used to extinguish the burning, resulting in the large quantities of steam and dust.

The best opportunities for reduction of emissions from coke making are in optimum design of facilities, implemented through an effective maintenance program. A number of new design features hold promise of limiting escape of pollutants to the atmosphere during the charging, coking, discharging, and quenching operations.

In beehive coke ovens, all materials from the destructive distillation of coal are emitted to the atmosphere as large clouds of smoke and objectionable odors. The only effective means of control for this out-dated operation is conversion of beehive ovens to by-product ovens.

Table F-6. BY-PRODUCT COKE OVEN PLANTS
1967

State City	SMSA	Company	Capacity		
			Annual Tons Coal Carb. Cap.	Tons Per Day Coal	Tons Per Day Coke
ALABAMA					
Tarrant	Birmingham	Alabama By-Products Corp.	900,000		
Holt	Tuscaloosa	Empire Coke Co.	150,000		
Gadsden	Gadsden	Republic Steel Corp.			
Birmingham	Birmingham	U.S. Pipe & Foundry Co.	1,175,000		
Fairfield	Birmingham	U.S. Steel Corp.			
Woodward	Birmingham	Woodward Iron Co.	1,288,000		
CALIFORNIA					
Fontana	San Bernardino-Riverside-Ontario	Kaiser Steel Corp.		6800	4115
COLORADO					
Pueblo	Pueblo	CF&I Steel Corp.		3650	2370
CONNECTICUT					
New Haven	New Haven	Connecticut Coke Co.		1600	1100
ILLINOIS					
Waukegan	Chicago	General Motors Corp.	76,000		
Granite City	St. Louis	Granite City Steel Co.		3275	2350
Chicago	Chicago	Interlake Steel Corp.	949,000		
Chicago	Chicago	International Harvester Co.		3000	2050
Chicago	Chicago	Republic Steel Corp.			
INDIANA					
Indianapolis	Indianapolis	Citizens Gas & Coke Utility		1850	1450

State City	SMSA	Company	Capacity		
			Annual Tons Coal Carb. Cap.	Tons Per Day Coal	Tons Per Day Coke
INDIANA (cont.)					
Terre Haute	Terre Haute	Indiana Gas & Chemical Corp.		560	420
East Chicago	Gary-Hammond-East Chicago	Inland Steel Co.		8350	5700
East Chicago	Gary-Hammond-East Chicago	Inland Steel Co.		3400	2300
Gary	Gary-Hammond-East Chicago	U.S. Steel Corp.			
Indiana Harbor	Gary-Hammond-East Chicago	Youngstown Sheet & Tube Co.	1,827,064(a)		
KENTUCKY					
Ashland	Huntington-Ashland	Semet-Solvay Div., Allied Chemical Corp.	1,900,000		
MARYLAND					
Sparrows Point	Baltimore	Bethlehem Steel Corp.	4,900,000		
MICHIGAN					
Detroit	Detroit	Semet-Solvay Div., Allied Chemical Corp.	643,500		
Dearborn	Detroit	Ford Motor Co.		4933	4000
Zug Island (Detroit)	Detroit	Great Lakes Steel Corp.		7300	5585
MINNESOTA					
St. Paul	Minneapolis-St. Paul	Koppers Co., Inc.		520	385
Duluth	Duluth-Superior	U.S. Steel Corp.			
MISSOURI					
St. Louis	St. Louis	Great Lakes Carbon Corp.	285,800		

State City	SMSA	Company	Capacity		
			Annual Tons Coal Carb. Cap.	Tons Per Day Coal	Tons Per Day Coke
NEW JERSEY					
Kearny	Jersey City	Koppers Co., Inc.		2000	1400
NEW YORK					
Buffalo	Buffalo	Semet-Solvay Div., Allied Chemical Corp.	1,080,000		
Lackawanna	Buffalo	Bethlehem Steel Corp.	3,550,000		
Buffalo	Buffalo	Donner-Hanna Coke Corp.		3600	
OHIO					
Ironton	Huntington-Ashland	Semet-Solvay Div., Allied Chemical Corp.	1,230.000		
New Miami	Hamilton-Middletown	Armco Steel Corp.		2560	1820
Middletown	Hamilton-Middletown	Armco Steel Corp.		2050	1500
Portsmouth	--	Detroit Steel Corp.	600,000		
Painesville	Cleveland	Diamond-Shamrock Corp.	176,300		
Toledo	Toledo	Interlake Steel Corp.	857,750		
Cleveland	Cleveland	Republic Steel Corp.			
Massilon	Canton	Republic Steel Corp.			
Warren	Youngstown-Warren	Republic Steel Corp.			
Youngstown	Youngstown-Warren	Republic Steel Corp.			
Lorain	Lorain-Elyria	U.S. Steel Corp.			
Campbell	Youngstown-Warren	Youngstown Sheet & Tube Co.	1,946,007(b)		
Youngstown	Youngstown-Warren	Youngstown Sheet & Tube Co.			
PENNSYLVANIA					
Swedeland	Philadelphia	Alan Wood Steel Co.		2200	1640

State City	SMSA	Company	Capacity		
			Annual Tons Coal Carb. Cap.	Tons Per Day Coal	Tons Per Day Coke
PENNSYLVANIA (cont.)					
Bethlehem	Allentown-Bethlehem-Easton	Bethlehem Steel Corp.	2,450,000		
Johnstown	Johnstown	Bethlehem Steel Corp.	530,000		
Johnstown	Johnstown	Bethlehem Steel Corp.	1,650,000		
Midland	Pittsburgh	Crucible Steel Co. of America		1880	1400
Erie	Erie	Interlake Steel Corp.	401,500		
Aliquippa	Pittsburgh	Jones & Laughlin Steel Corp.	2,121,501		
Pittsburgh	Pittsburgh	Jones & Laughlin Steel Corp.	2,755,750		
Philadelphia	Philadelphia	Philadelphia Coke, Div. Eastern Gas & Fuel Associates		1960	1470
Monessen	Pittsburgh	Pittsburgh Steel Co.	600,000		
Pittsburgh	Pittsburgh	Shenango Inc.		2800	1960
Clairton	Pittsburgh	U.S. Steel Corp.			
Fairless Hills	Philadephia	U.S. Steel Corp.			
TEXAS					
Lone Star	--	Lone Star Steel Co.		1365	956
Houston	Houston	Armco Steel Corp.	579,000		
UTAH					
Provo	Provo-Orem	U.S. Steel Corp.			
WEST VIRGINIA					
Weirton	Steubenville-Weirton	National Steel Corp.	2,400,000		
Fairmont	--	Sharon Steel Corp.		985	670
Follansbee	Steubenville-Weirton	Wheeling Steel Corp.	2,628,000		

State City	SMSA	Company	Capacity Annual Tons Coal Carb. Cap.	Capacity Tons Per Day Coal	Capacity Tons Per Day Coke
WISCONSIN					
Milwaukee	Milwaukee	Milwaukee Solvay Coke Co., Div. Pickands Mather & Co.		2095	1562

(a) Tons Coal Carb. 1966

(b) Tons Coal Carb. 1965

F.6 Cotton Gins

Problems from air pollution near cotton gins have become more serious because gins in some locations have been surrounded by residences and business establishments. Generally, gins are still located in the country or in small towns, but there are exceptions; for example, 2-3 plants are inside the city limits of Lubbock, Texas, a city of over 150,000 people.

There are currently 4,448 active gins in the United States(9) (see table F-8). Their individual production ranges from 200-300 bales to 15,000-20,000 bales per year. The gins are located in all of the southern tier of States from California to Virginia with the most cotton being ginned in Texas. The geographical distribution of gins is shown in figure G-5. There were 10,830,564 bales of cotton ginned in the United States through January 15, 1969 from the crop of 1968.(9) A standard bale of ginned cotton weighs 500 pounds and the waste material for each bale produced can weigh up to 1,500 pounds.

Lint fly, dust, and gin trash (consisting of leaf particles, burs, sticks, stems, motes, and other extraneous material) are the air contaminants from cotton gins. Total particulates discharged without air pollution control equipment is about 11.7 pounds per 500 pound bale of cotton.(10)

The most satisfactory methods used to collect cotton gin air contaminants are cyclones and lint fly catchers. Dust houses or settling chambers are also used successfully at some gins. Considerable work has been done on selecting the proper size and arrangement of cyclone equipment. As a general rule, smaller cyclones are more efficient than large ones. Table F-7 shows the trash-collecting efficiency of large and small diameter cyclones.

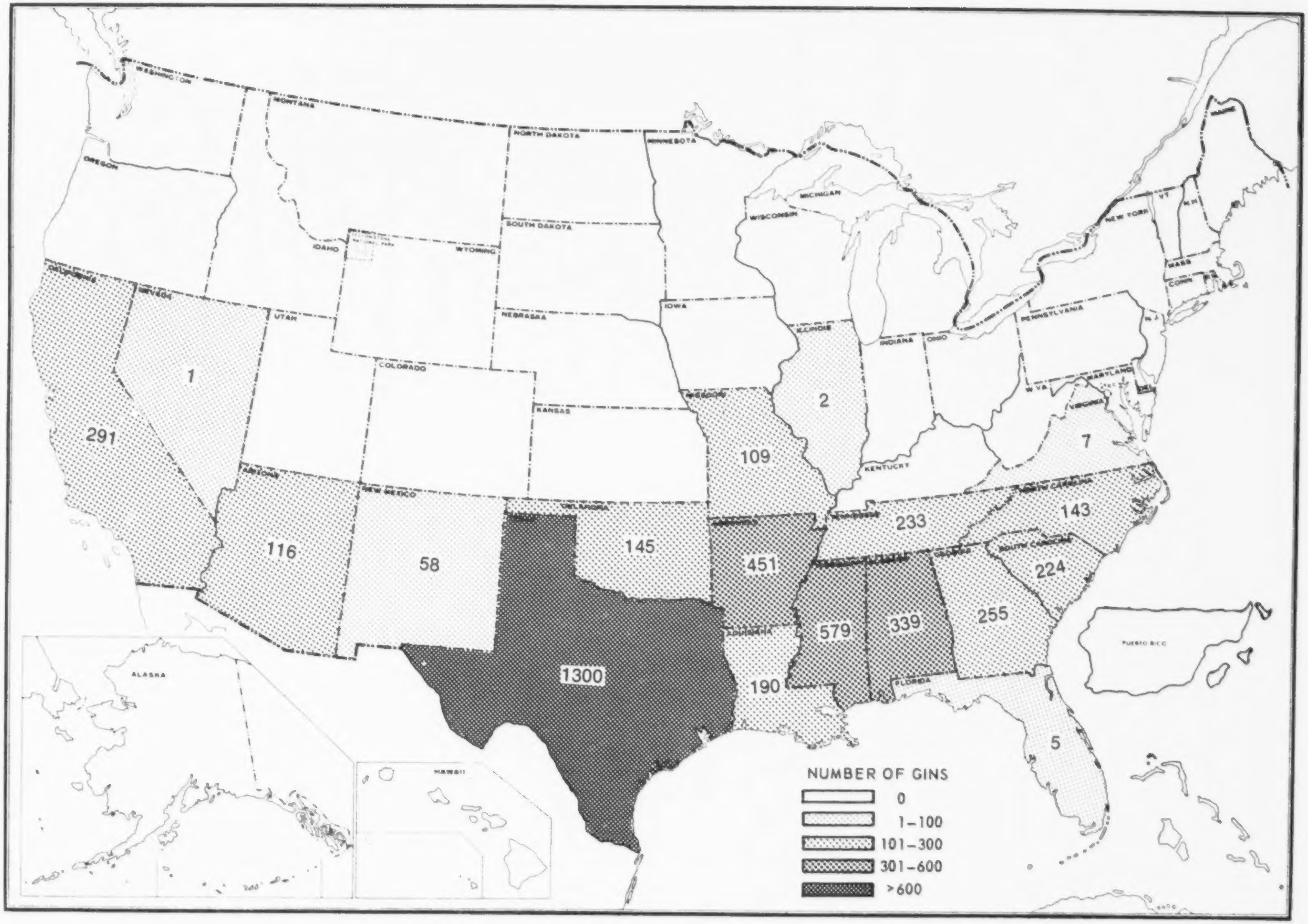
291
1
116
58
1300
145
109
451
190
2
579
339
233
143
224
255
7
5
WASHINGTON
OREGON
CALIFORNIA
NEVADA
IDAHO
MONTANA
WYOMING
UTAH
ARIZONA
COLORADO
NEW MEXICO
NORTH DAKOTA
SOUTH DAKOTA
NEBRASKA
KANSAS
OKLAHOMA
MINNESOTA
IOWA
MISSOURI
ARKANSAS
LOUISIANA
WISCONSIN
MICHIGAN
ILLINOIS
INDIANA
OHIO
KENTUCKY
TENNESSEE
MISSISSIPPI
ALABAMA
GEORGIA
FLORIDA
SOUTH CAROLINA
NORTH CAROLINA
VIRGINIA
W VA
MARYLAND
PENNSYLVANIA
NEW YORK
VT
N H
MAINE
MASS
CONN
N J
PUERTO RICO
ALASKA
HAWAII
NUMBER OF GINS
0
1–100
101–300
301–600
>600

Figure F-5. Cotton gins, February 1968.

Table F-7. TRASH-COLLECTING EFFICIENCY OF LARGE- AND SMALL-DIAMETER CYCLONES(11)

Cyclone	Air volume,[a] cfm	Trash volume,[b] gram/min	Efficiency, %
Large diameter, low pressure:			
Trash exit opened	6,204	25.789	79.73
Trash exit closed	6,061	29.127	63.03
Small diameter, high pressure;			
Trash exit opened	5,917	20.241	83.86
Trash exit closed	5,767	17.614	84.34

[a] Air volume range on small-diameter cyclones: 4,580 to 6,771 cfm; two cyclones are used parallel. On large-diameter cyclone: 4,965 to 6,771 cfm; one cyclone used.

[b] Trash volume range on small-diameter cyclone: 4.636 to 55.033 gram/min. One large-diameter cyclone: 6.847 to 76.268 gram/min.

Generally speaking, most of the gins in the country have little or no air pollution control equipment except for States such as Texas which have emission standards. At one gin in Lubbock, Texas, investment for the air pollution equipment is 29 percent of the total equipment investment.(12)

The methods of disposing of gin waste after it has been collected have generally been incineration and composting. Incineration creates smoke and particulate emissions such as sparks and ash.

Table F-8. COTTON GINS
1969

State County	SMSA	Bales of cotton ginned, 1968*
ALABAMA		
Autauga	--	8,790
Barbour	--	2,917
Blount	--	4,093
Butler	--	2,861
Cherokee	--	21,404
Colbert	--	13,781
Conecuh	==	5.089
Covington	--	4,260
Crenshaw	--	2,453
Cullman	--	9,503
Dallas	--	16,227
De Kalb	--	11,483
Elmore	Montgomery	12,279
Escambia	--	7,253
Etowah	Gadsden	3,099
Fayette	--	5,073
Franklin	--	4,833
Geneva	--	7,501
Greene	--	5,980
Hale	--	8,434
Houston	--	4,160
Jackson	--	6,787
Lamar	--	5,246

State County	SMSA	Bales of cotton ginned, 1968
ALABAMA (cont.)		
Lauderdale	--	14,287
Lawrence	--	22,022
Limestone	Huntsville	36,572
Lowndes	--	3,213
Macon	--	7,814
Madison	Huntsville	31,405
Marengo	--	6,572
Marion	--	3,971
Marshall	--	11,135
Monroe	--	10,023
Montgomery	Montgomery	3,939
Morgan	--	10,645
Perry	--	3,708
Pickens	--	7,508
Pike	--	917
Russell	Columbus	5,294
Shelby	--	5,702
Sumter	--	3,057
Tuscaloosa	Tuscaloosa	8,101
Wilcox	--	4,653
All other	--	27,909
ARIZONA		
Cochise	--	16,936
Graham	--	22,312

State County	SMSA	Bales of cotton ginned, 1968
ARIZONA (cont.)		
Maricopa	Phoenix	294,968
Pima	Tucson	36,837
Pinal	--	242,006
Yuma	--	103,340
All other	--	2,267
ARKANSAS		
Arkansas	--	5,909
Ashley	--	40,190
Chicot	--	38,816
Clay	--	19,786
Craighead	--	63,915
Crittenden	Memphis	66,916
Cross	--	22,019
Desha	--	44,823
Drew	--	10,143
Greene	--	20,544
Jackson	--	24,756
Jefferson	Pine Bluff	69,126
Lafayette	--	10,866
Lawrence	--	11,063
Lee	--	44,872
Lincoln	--	31,380
Lonoke	--	47,967
Miller	Texarkana	6,079
Mississippi	--	164,762

State County	SMSA	Bales of cotton ginned, 1968
ARKANSAS (cont.)		
Monroe	--	30,191
Phillips	--	78,599
Poinsett	--	71,438
Pulaski	Little Rock-North Little Rock	6,034
Randolph	--	5,412
St. Francis	--	40,854
White	--	2,058
Woodruff	--	25,232
Yell	--	3,914
All other	--	18,089
CALIFORNIA		
Fresno	Fresno	401,864
Imperial	--	112,529
Kern	Bakersfield	434,183
Kings	--	207,764
Madera	--	66,773
Merced	--	62,511
Riverside	San Bernardino-Riverside-Ontario	56,729
Tulare	--	236,010
FLORIDA		
Total	--	10,234
GEORGIA		
Bartow	--	7,210
Bleckley	--	4,018

State County	SMSA	Bales of cotton ginned, 1968
GEORGIA (cont.)		
Brooks	--	662
Bulloch	--	4,265
Burke	--	17,030
Calhoun	--	4,033
Candler	--	1,911
Colquitt	--	17,886
Crisp	--	8,641
Dodge	--	3,025
Dooly	--	23,374
Emanuel	--	5,621
Floyd	--	1,540
Gordan	--	2,299
Hart	--	2,928
Jefferson	--	8,408
Johnson	--	4,317
Laurens	--	10,091
Macon	--	6,319
Meriwether	--	1,466
Mitchell	--	4,277
Morgan	--	4,832
Pulaski	--	6,539
Screven	--	5,034
Sumter	--	7,626
Taylor	--	6,640
Terrell	--	6,942

State County	SMSA	Bales of cotton ginned, 1968
GEORGIA (cont.)		
Tift	--	3,456
Toombs	--	4,520
Turner	--	4,435
Walton	--	3,447
Washington	--	6,725
Wilcox	--	4,329
Worth	--	4,809
All other	--	57,211
LOUISIANA		
Acadia	--	5,151
Avoyelles	--	18,952
Bossier	Shreveport	10,565
Caddo	Shreveport	34,016
Caldwell	--	12,713
Catahoula	--	17,500
Concordia	--	15,998
East Carroll	--	43,300
Evangeline	--	4,070
Franklin	--	72,977
Lafayette	Lafayette	4,999
Madison	--	14,627
Morehouse	--	46,906
Natchitoches	--	17,522
Ouachita	Monroe	19,162

State County	SMSA	Bales of cotton ginned, 1968
LOUISIANA (cont.)		
Rapides	--	33,238
Red River	--	6,802
Richland	--	62,790
St. Landry	--	21,850
Tensas	--	34,722
West Carroll	--	30,482
All other	--	10,773
MISSISSIPPI		
Alcorn	--	5,591
Amite	--	1,019
Attala	--	6,710
Benton	--	6,534
Bolivar	--	155,285
Calhoun	--	12,627
Carroll	--	8,433
Chickasaw	--	8,270
Clay	--	2,895
Coahoma	--	136,918
Copiah	--	4,660
De Soto	--	26,132
Grenada	--	11,891
Hinds	Jackson	16,129
Holmes	--	53,515
Humphreys	--	58,278

State County	SMSA	Bales of cotton ginned, 1968
MISSISSIPPI (cont.)		
Issaquena	--	9,880
Itawamba	--	4,703
Jefferson Davis	--	5,031
Lafayette	--	5,306
Leake	--	7,907
Lee	--	9,799
Leflore	--	95,408
Lowndes	--	7,373
Madison	--	31,547
Marion	--	1,775
Marshall	--	21,757
Monroe	--	19,287
Montgomery	--	6,634
Noxubee	--	6,768
Panola	--	40,848
Pontotoc	--	10,706
Prentiss	--	6,422
Quitman	--	61,610
Scott	--	6,715
Sharkey	--	46,469
Sunflower	--	161,673
Tallahatchie	--	65,268
Tate	--	22,100
Tippah	--	10,285

State County	SMSA	Bales of cotton ginned, 1968
MISSISSIPPI (cont.)		
Tishomingo	--	4,380
Tunica	--	46,190
Union	--	4,664
Walthall	--	1,202
Washington	--	137,524
Webster	--	5,652
Winston	--	7,755
Yalobusha	--	10,067
Yazoo	--	63,333
All other	--	35,452
MISSOURI		
Butler	--	3,602
Dunklin	--	61,325
Mississippi	--	5,477
New Madrid	--	46,473
Pemiscot	--	64,512
Scott	--	4,694
Stoddard	--	8,962
All other	--	654
NEVADA		
Total	--	4,109
NEW MEXICO		
Chaves	--	30,348

State County	SMSA	Bales of cotton ginned, 1968
NEW MEXICO (cont.)		
Dona Ana	--	47,858
Eddy	--	34,317
Lea	--	17,114
Luna	--	17,394
Roosevelt	--	6,999
All other	--	9,571
NORTH CAROLINA		
Anson	--	4,622
Cleveland	--	6,718
Edgecombe	--	3,904
Franklin	--	1,008
Halifax	--	16,174
Harnett	--	5,137
Iredell	--	329
Johnston	--	1,282
Nash	--	4,287
Northampton	--	13,846
Pitt	--	1,629
Robeson	--	24,255
Rowan	--	844
Rutherford	--	688
Sampson	--	7,253
Scotland	--	17,651
Union	Charlotte	1,910

State County	SMSA	Bales of Cotton ginned, 1968
NORTH CAROLINA (cont.)		
Warren	--	1,187
Wilson	--	1,218
All other	--	15,335
OKLAHOMA		
Beckham	--	27,845
Blaine	--	2,899
Bryan	--	2,860
Caddo	--	18,046
Canadian	Oklahoma City	2,450
Comanche	Lawton	1,259
Custer	--	10,110
Grady	--	6,679
Greer	--	14,864
Harmon	--	20,553
Jackson	--	31,348
Kiowa	--	20,704
Muskogee	--	4,529
Roger Mills	--	3,065
Tillman	--	32,658
Washita	--	31,862
All other	--	23,917
SOUTH CAROLINA		
Abbeville	--	2,747
Aiken	Augusta	4,862

State County	SMSA	Bales of Cotton ginned, 1968
SOUTH CAROLINA (cont.)		
Anderson	--	4,091
Bamberg	--	8,938
Barnwell	--	4,206
Calhoun	--	8,560
Cherokee	--	1,981
Chester	--	1,777
Chesterfield	--	5,253
Claredon	--	19,424
Darlington	--	17,383
Dillon	--	14,167
Dorchester	--	3,042
Edgefield	--	2,992
Florence	--	14,260
Hampton	--	3,898
Lancaster	--	1,211
Laurens	--	1,668
Lee	--	31,451
Lexington	Columbia	3,578
Marion	--	4,309
Marlboro	--	23,230
Newberry	--	416
Orangeburg	--	31,079
Richland	Columbia	1,193
Spartanburg	--	2,152

State County	SMSA	Bales of Cotton ginned, 1968
SOUTH CAROLINA (cont.)		
Sumter	--	26,143
Williamsburg	--	6,781
York	--	3,331
All other	--	8,637
TENNESSEE		
Carroll	--	10,142
Chester	--	5,292
Crockett	--	27,918
Dyer	--	21,586
Fayette	--	22,389
Gibson	--	34,082
Giles	--	833
Hardeman	--	13,700
Hardin	--	1,901
Haywood	--	28,202
Henderson	--	5,134
Lake	--	18,220
Lauderdale	--	32,159
Lawrence	--	6,321
Lincoln	--	5,959
McNairy	--	6,908
Madison	--	20,287
Obion	--	4,288
Shelby	Memphis	18,346

State County	SMSA	Bales of Cotton ginned, 1968
TENNESSEE (cont.)		
Tipton	--	30,951
Weakley	--	2,562
All other	--	3,775
TEXAS		
Austin	--	3,568
Bailey	--	71,813
Bastrop	--	2,527
Baylor	--	8,598
Bell	--	16,001
Bowie	Texarkana	3,970
Brazoria	Houston	5,429
Brazos	--	19,400
Briscoe	--	12,881
Burleson	--	12,077
Caldwell	--	4,608
Calhoun	--	3,036
Cameron	Brownsville-Harlingen-San Benito	94,661
Castro	--	25,740
Childress	--	27,856
Cochran	--	43,720
Coleman	--	6,408
Collin	Dallas	36,532
Collingsworth	--	28,427
Colorado	--	3,111

State County	SMSA	Bales of Cotton ginned, 1968
TEXAS (cont.)		
Coryell	--	4,343
Cottle	--	23,275
Crosby	--	73,204
Dawson	--	175,947
Delta	--	10,576
Dickens	--	26,824
Donley	--	8,158
Ellis	Dallas	54,816
El Paso	El Paso	61,793
Falls	--	9,591
Fannin	--	13,023
Fayette	--	1,637
Fisher	--	47,670
Floyd	--	40,409
Foard	--	5,489
Fort Bend	Houston	21,245
Gaines	--	75,711
Garza	--	21,549
Glasscock	--	14,748
Grayson	--	8,091
Grimes	--	821
Guadalupe	San Antonio	3,609
Hale	--	68,270
Hall	--	61,158

State County	SMSA	Bales of Cotton ginned, 1968
TEXAS (cont.)		
Hardeman	--	14,317
Haskell	--	59,831
Hays	--	2,094
Hidalgo	--	99,039
Hill	--	46,974
Hockley	--	168,474
Houston	--	5,612
Howard	--	50,833
Hudspeth	--	12,207
Hunt	--	21,845
Jackson	--	3,170
Jim Wells	--	6,989
Johnson	Fort Worth	11,167
Jones	Abilene	67,141
Karnes	--	1,836
Kaufman	--	11,969
Knox	--	22,011
Lamar	--	10,496
Lamb	--	106,747
Lavaca	--	2,083
Lubbock	Lubbock	179,726
Lynn	--	171,144
McCulloch	--	5,002
McLennan	Waco	25,191

State County	SMSA	Bales of Cotton ginned, 1968
TEXAS (cont.)		
Martin	--	77,363
Matagorda	--	5,848
Midland	Midland	13,824
Milam	--	13,520
Mitchell	--	28,069
Motley	--	13,458
Navarro	==	23,587
Nolan	--	26,265
Nueces	Corpus Christi	53,783
Parmer	--	36,956
Pecos	--	26,591
Red River	--	2,967
Reeves	--	69,311
Refugio	--	2,324
Robertson	--	28,292
Rockwall	--	7,847
Runnels	--	55,321
San Patricio	Corpus Christi	36,806
Scurry	--	42,997
Swisher	--	11,866
Tarrant	Fort Worth	4,759
Taylor	Abilene	10,461
Terry	--	116,559
Tom Green	San Angelo	38,305

State County	SMSA	Bales of Cotton ginned, 1968
TEXAS (cont.)		
Travis	Austin	6,817
Victoria	--	4,024
Washington	--	2,085
Wharton	--	33,615
Wheeler	--	10,775
Wilbarger	--	25,322
Willacy	--	47,962
Williamson	--	56,514
Yoakum	--	37,039
Zavala	--	6,393
All other	--	111,286
ALL OTHER STATES		
Total	--	4,249

F.7 Ferroalloys

Ferroalloys, the master alloys of the iron and steel industry, are used for deoxidation, alloying, and graphitization of steel. Manganese is the most widely used element in ferroalloys, followed by silicon, chromium, and phosphorus. Others include molybdenum, tungsten, titanium, zirconium, vanadium, boron, and columbium.

Production of ferroalloys generates large volumes of carbon monoxide and sulfur-containing gases as well as metal fumes characteristic of high temperature steel production processes.

In 1966, there were 51 listed plants producing ferroalloys in 17 States(13) (see table F-9). Geographical distribution of plants is shown in figure F-6. Ohio led in total production followed by Pennsylvania; these two states account for 35 percent of the plants and about one-half of these are located in SMSA's. Individual plant capacities may exceed 100,000 tons per year although most are much smaller. Total production in 1966 was 2,503,000 tons.(13)

The annual consumption of ferroalloys is closely related to the production of steel. The amount of each alloy used in total steel production remains fairly constant. Electric furnaces account for about 75 percent of the total production, and blast furnaces using ferromanganese and silvery iron account for most of the remainder. The aluminothermic process is the only additional process of any significance.

There are two portions of the ferroalloy production cycle that are difficult to control. The first portion is associated with charging the

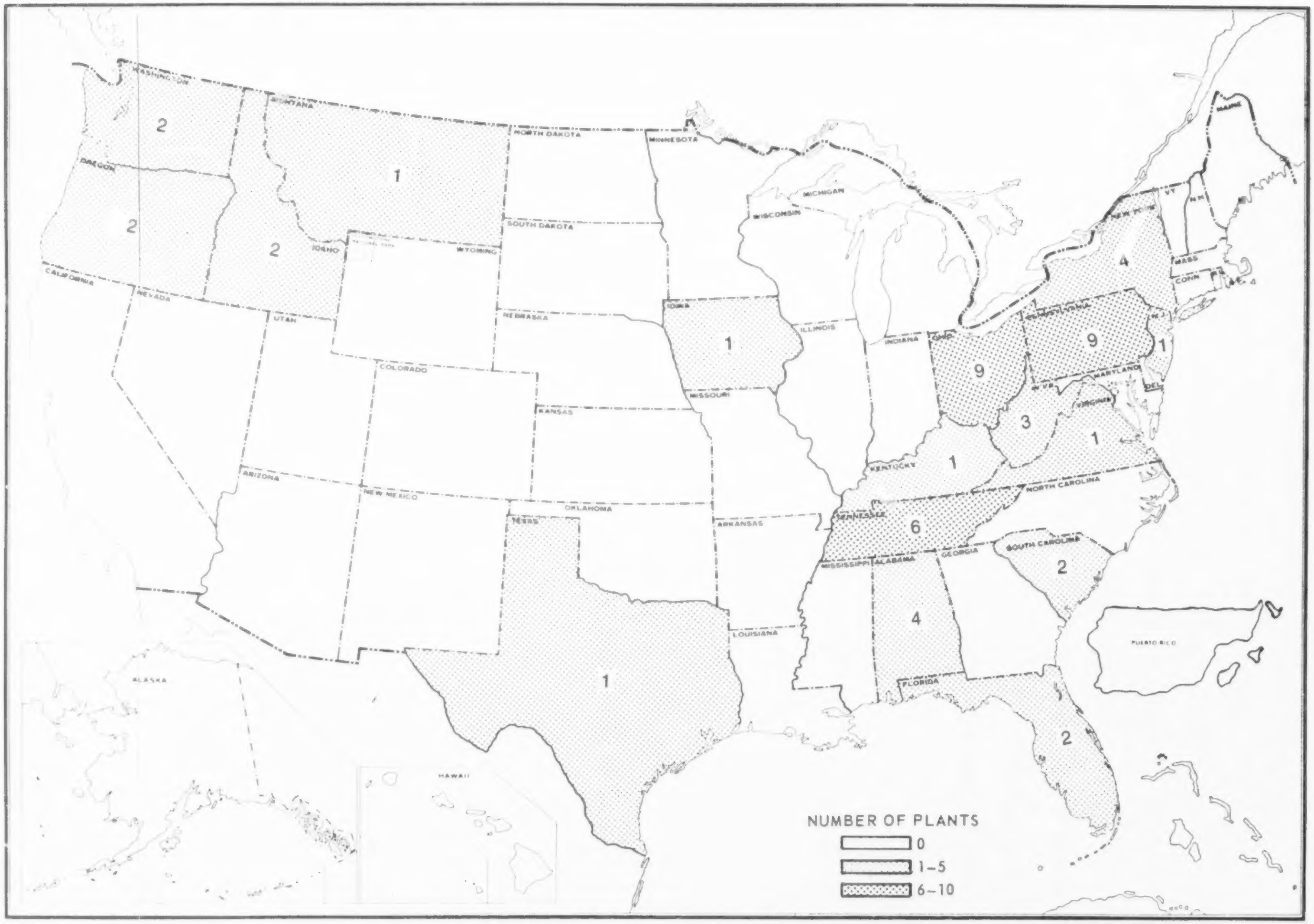
WASHINGTON
2
OREGON
2
CALIFORNIA
NEVADA
IDAHO
2
MONTANA
1
WYOMING
UTAH
COLORADO
ARIZONA
NEW MEXICO
NORTH DAKOTA
SOUTH DAKOTA
NEBRASKA
KANSAS
OKLAHOMA
TEXAS
1
MINNESOTA
IOWA
1
MISSOURI
ARKANSAS
LOUISIANA
WISCONSIN
MICHIGAN
ILLINOIS
INDIANA
OHIO
9
KENTUCKY
1
TENNESSEE
6
MISSISSIPPI
ALABAMA
4
GEORGIA
FLORIDA
2
SOUTH CAROLINA
2
NORTH CAROLINA
VIRGINIA
1
W. VA.
3
MARYLAND
DEL
PENNSYLVANIA
9
N.J.
1
NEW YORK
4
CONN
MASS
VT
N.H.
MAINE
ALASKA
HAWAII
PUERTO RICO
NUMBER OF PLANTS
0
1–5
6–10

Figure F-6. Ferroalloy producers, 1965.

electric furnaces. Air pollution control can be achieved during the refining and tapping periods. However, since these furnaces are charged by swinging the roof aside, the required overhead equipment makes it extremely difficult to contain the cloud of pollutants which emerges when a charge is introduced to the melt. Redesign of the scrap-charging operation is needed before successful collection can be accomplished.

The second portion also occurs in the use of ferroalloys in an open vessel. That is, when ferroalloys are added into the receiving ladle during tapping, large amounts of ferroalloy fumes evolve, and these are difficult to capture and control.

Within the limitations stated above, most of the ferroalloy processes have limited gas-cleaning operations which may only consist of a settling chamber for particulate collection. Operating costs of additional gas cleaning may be reduced by use of the heat from burning the gases or by recovery of valuable metallic dust.

Table F-9. FERROALLOY PRODUCTION PLANTS
1966

State City	SMSA	Company	Product
ALABAMA			
Birmingham	Birmingham	U.S. Steel Corp.	FeMn
Muscle Shoals	--	Tennessee Valley Authority	FeP
Sheffield	--	Union Carbide Corp., Mining & Metals Div.	FeMn, FeSi
Woodward	Birmingham	Woodward Iron Co.	FeSi
FLORIDA			
Nichols	--	Mobile Chemical Co., Ind. Chemical Div.	FeP
Pierce	--	Agrico Chemical Co.	FeP
IDAHO			
Pocatello	--	FMC Corp., Mineral Products Division	FeP
Soda Springs	--	Monsanto	FeP
IOWA			
Keokuk	--	Keokuk Electro-Metals Co., Div. of Vanadium Corp. of America	FeSi, silvery iron
KENTUCKY			
Calvert City	--	Pittsburgh Metallurgical Co.	FeMn, SiMn, FeSi, FeCr, silvery iron
MONTANA			
Anaconda	--	The Anaconda Co.	FeMn
NEW YORK			
Buffalo	Buffalo	The Hanna Furnace Corp.	Silvery iron
Niagara Falls	Buffalo	Titanium Alloy Manuf., Div. National Lead Co.	FeTi, other

State City	SMSA	Company	Product
NEW YORK (cont.)			
Niagara Falls	Buffalo	Pittsburgh Metallurgical Co.	FeSi, FeCr, SiMn, silvery iron
Niagara Falls	Buffalo	Union Carbide Corp., Mining & Metals Div.	FeW, FeV, FeTi, FeB, FeCr, FeCb, FeCbTa, other
NEW JERSEY			
Newfield	Trenton	Shieldalloy Corp.	FeV, FeTi, FeB, FeMo, FeCb, FeCbTa, other
OHIO			
Ashtabula	--	Union Carbide Corp., Mining & Metals Div.	FeMn, SiMn, FeSi
Beverly	--	Interlake Steel Corp.	SiMn, FeSi, FeCr, Si, silvery iron
Brilliant	Steubenville-Weirton	Ohio Ferro-Alloys Corp.	FeSi, FeCr
Cambridge	--	Vanadium Corp. of America	FeTi, FeV, FeB, FeCb, other
Jackson	--	Jackson Iron & Steel Co.	Silvery iron
Marietta	--	Union Carbide Corp., Mining & Metals Div.	FeCr, FeMn, SiMn, FeSi
Philo	--	Ohio Ferro-Alloys Corp.	FeSi, FeMn, SiMn, other
Powhatan Point	Wheeling	Ohio Ferro-Alloys Corp.	FeSi, Si
Vancoram	Steubenville-Weirton	Vanadium Corp. of America	FeSi, FeCr
OREGON			
Portland	Portland	Union Carbide Corp., Mining & Metals Div.	FeMn, SiMn, FeSi
Riddle	Portland	Hanna Nickel Smelting	FeSi, FeNi
PENNSYLVANIA			
Boyertown	Reading	Kawecki Chemical Co.	FeCb

State City	SMSA	Company	Product
PENNSYLVANIA (cont.)			
Clairton	Pittsburgh	U.S. Steel Corp.	FeMn
Duquesne	Pittsburgh	U.S. Steel Corp.	FeMn
Johnstown	Johnstown	Bethlehem Steel Co.	FeMn
Langeloth	Pittsburgh	Climax Molybdenum Co.	FeMo
Palmerton	--	The New Jersey Zinc Co.	Spln
Robesonia	Reading	Reading Alloys	FeV, FeW, FeCb, NiCb, FeMo
Sheridan	Pittsburgh	E. J. Lavino & Co.	FeMn
Washington	Pittsburgh	Molybdenum Corp. of America	FeMo, FeW, FeB, FeCb
SOUTH CAROLINA			
Charleston	Charleston	Mobil Chemical Co., Ind. Chemical Div.	FeP
Charleston	Charleston	Pittsburgh Metallurgical Co.	FeSi, FeCr, silvery iron
TENNESSEE			
Columbia	--	Hooker Chemical Corp.	FeP
Columbia	--	Monsanto	FeP
Mt. Pleasant	--	Mobil Chemical Co., Ind. Chemicals Div.	FeP
Mt. Pleasant	--	Stauffer Chemical Co.	FeP
Rockwood	--	Union Carbide Corp. Mining & Metals Div.	FeMn, SiMn, FeSi
Woodstock	Memphis	Chronium Mining & Smelting Corp.	FeMn, SiMn, FeSi, FeCr
TEXAS			
Houston	Houston	Tenn-Tex Alloy & Chemical Corp.	FeMn, SiMn
VIRGINIA			
Reusens	Lynchburg	E.J. Lavino & Co.	FeMn
WASHINGTON			
Tacoma	Tacoma	Ohio Ferro-Alloys Corp.	FeSi, Si

State City	SMSA	Company	Product
WASHINGTON (cont.)			
Wenatchee	--	Vanadium Corp. of America	FeSi, Si
WEST VIRGINIA			
Alloy	--	Union Carbide Corp., Mining & Metals Div.	FeMn, SiMn, FeSi, FeCr, Si, FeV, other
Graham	--	Vanadium Corp. of America	FeMn, FeSi, FeCr, other
Kingwood	--	Manganese Chemical Corp.	FeMn

F.8 Grain Mills and Grain Handling

The handling, cleaning, and storage of grain and its ultimate processing into animal feed, flour, or other end products include certain common operations which produce particulate waste. This waste has been estimated as 0.3 percent by weight of the bulk material handled.(14) Grain-handling facilities are widely distributed throughout the United States, as shown in figure F-7. Of 11,147 facilities(15-19) (see table F-10), 15 percent are located within SMSA's.

Particulates are generated each time grain is moved or transferred. The quantity of grain dust generated by any transfer or grain conveyance (by chute, transfer belt, open fall, or bucket elevator) is directly related to the degree of abrasion and attrition of the grain, the amount of previous handling, the characteristics of the transfer equipment, and the type of grain.

Some of the common operations encountered in grain handling and processing are loading, unloading, storage recycling, cleaning, sizing, blending, and separating.

Grain is generally received from the harvest operation in the unclean state. The unwanted foreign material may include grain bran, chaff, fiber stalks, stones, sand, broken cobs, metal, rust, weed seeds, pollens, spores of mold, insect parts, and siliceous dust from vegetation and soils.

The bulk of the grain produced in the United States is processed as feed or milled into flour. These processes are briefly described below.

Formula feed production - Formula feed production is one example of a processing plant in the grain industry. Basic food ingredients, depending

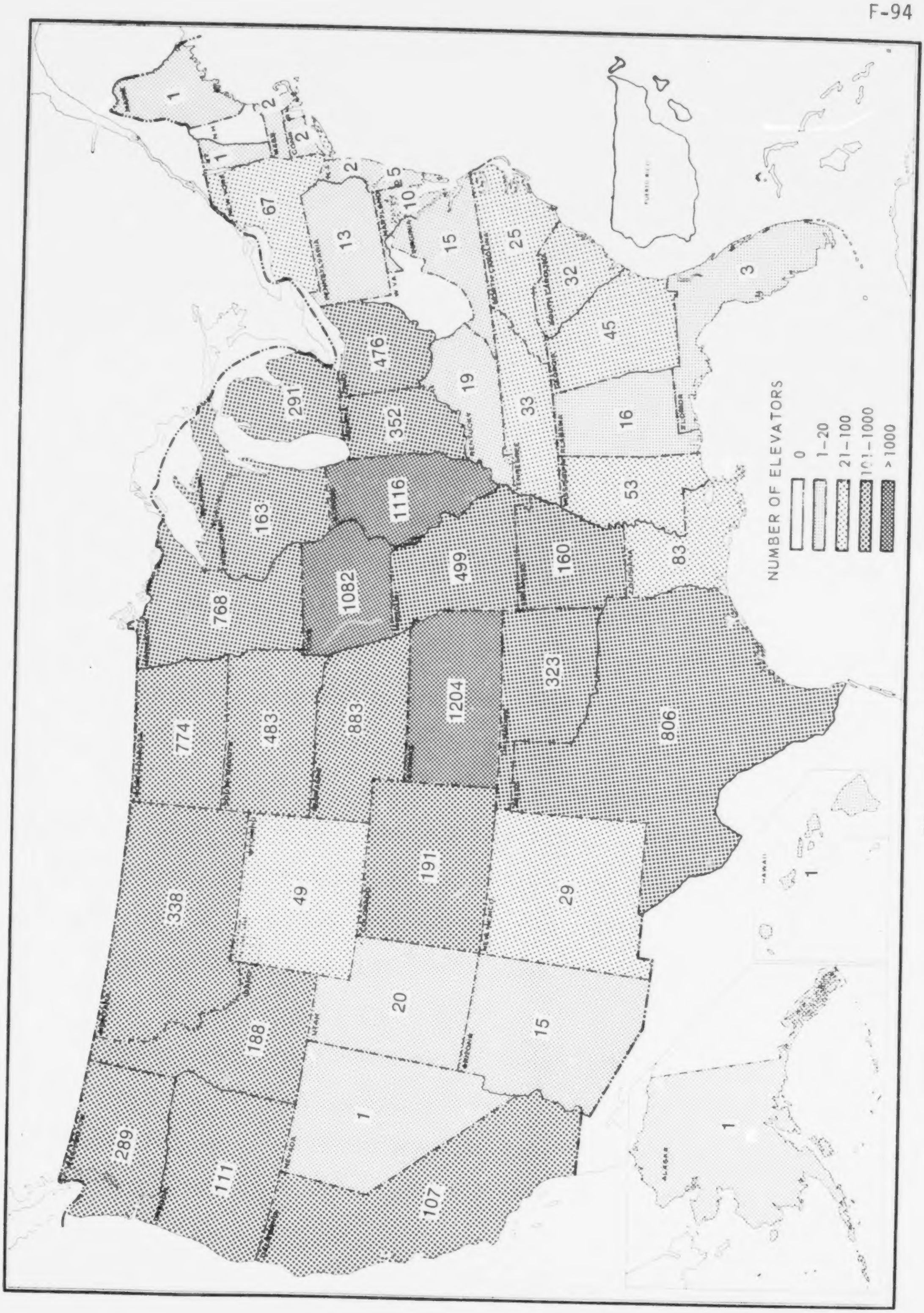
NUMBER OF ELEVATORS
0
1-20
21-100
101-1000
>1000
1
2
2
2
1
2
5
10
67
13
15
25
32
3
476
291
19
33
45
352
16
1116
163
53
1082
499
160
83
768
774
483
883
1204
323
806
338
49
191
29
20
15
188
1
289
111
107
1
1

Figure F-7. Grain Elevators, 1969.

on the formula requirements, are corn, oats, barley, soybean meal, and wheat bran (a flour mill by-product). Minor formula additives include fish meal, bone meal, alfalfa, flax meals, molasses, tankage, screenings, and calcium and phosphate minerals.

Particulates are generated during the unloading of bulk grains and other dry additives. In the production processes, grain grinding and pelletizing are potential sources of particulates. Strong and offensive odors are emission problems also.

Flour production (milling of grain) - In the milling of grain to produce flour, the basic processes are the same throughout the industry. Various types of flour are produced with the aid of additives, bleaching, and/or blending.

Potential air contaminants are primarily particulate emissions during loading and unloading. Other potential sources of contaminants are the processing of linseed and soybean oil and the malting of barley.

Figure F-8 shows the geographical distribution of the 618 flour mills(15,20) (see table F-11) in the United States; approximately 35 percent of these mills are within SMSA's.

Grain dust control - Grain dust is a unique source of potential air contaminants. Fine grain dust is the major emission problem. Cyclone separators, followed occasionally by fabric filters in the best systems, are the most common pollution control devices.

Enclosed or semienclosed areas can be used for grain loading and unloading to control large quantities of dust; these areas, when kept under negative pressure with the direction of air flow controlled and with adequate collectors on the exhaust, can be kept at reasonable

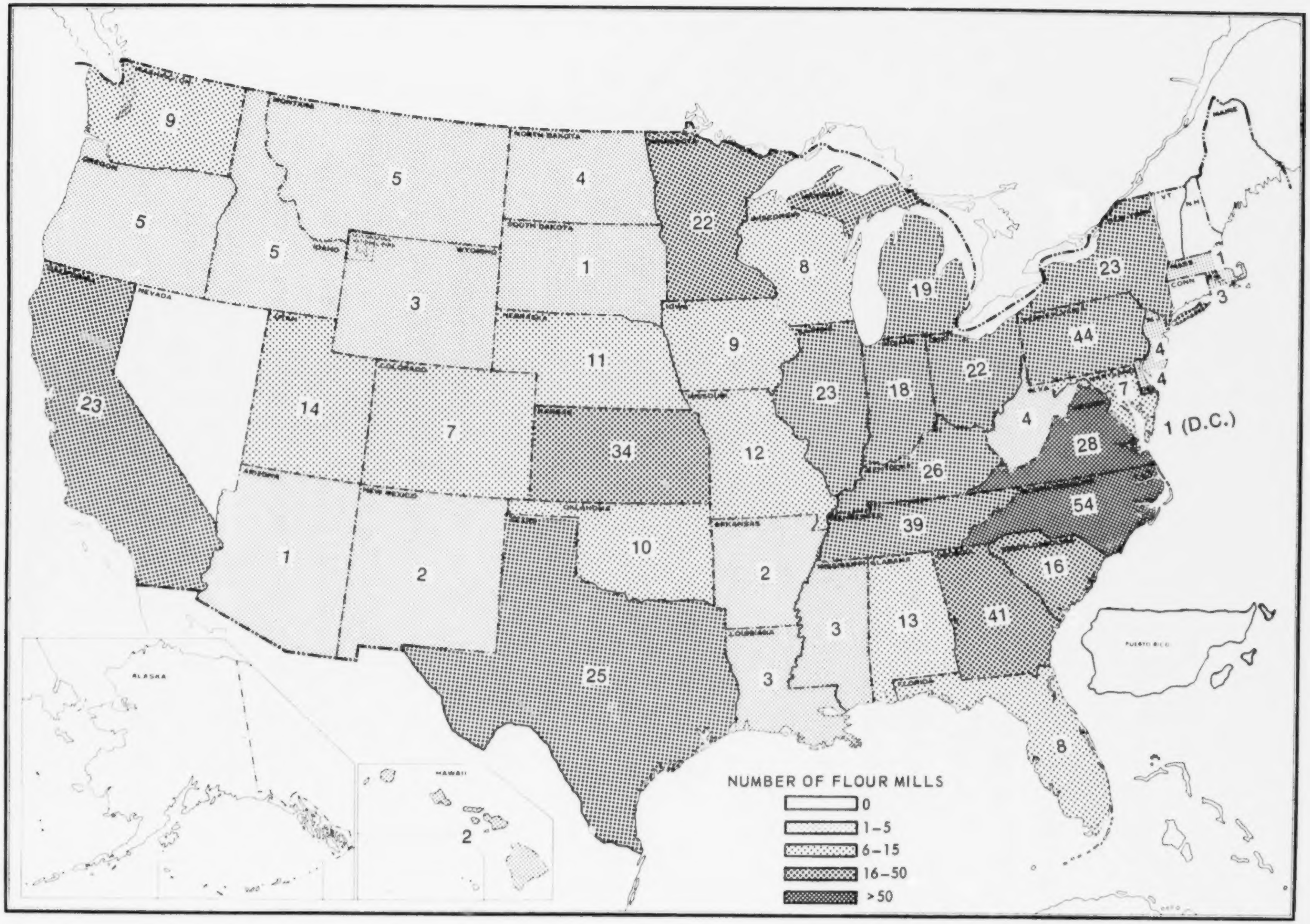
9
5
4
5
22
5
1
8
23
3
19
1
3
9
11
44
22
4
4
7
23
18
14
7
34
4
28
1 (D.C.)
12
26
54
39
1
2
10
2
16
41
3
13
25
3
8
2
NUMBER OF FLOUR MILLS
0
1–5
6–15
16–50
>50

Figure F-8. Flour Mills, 1966.

emission levels.

As is the case with any air pollution control operation, proper maintenance is required for efficient air cleaning. Grain dust, which can plug cyclone separators rather easily, is abrasive and causes rapid wear. Cyclone separators require periodic inspection and routine maintenance.

Table F-10. GRAIN STORAGE
January 1969

State County	SMSA	Number of Elevators
ALABAMA		
Baldwin	Mobile	2
Chilton	--	1
Dallas	--	1
Fayette	--	1
Greene	--	1
Houston	--	1
Lauderdale	--	1
Limestone	Huntsville	1
Marshall	--	2
Mobile	Mobile	1
Montgomery	Montgomery	1
Morgan	--	1
Pickens	--	1
Talladega	--	1
ALASKA		
Palmer	--	1
ARIZONA		
Cochise	--	3
Maricopa	Phoenix	6
Pima	Tucson	1
Pinal	--	4
Yuma	--	1

State County	SMSA	Number of Elevators
ARKANSAS		
Arkansas	--	18
Ashley	--	2
Benton	--	2
Calhoun	--	1
Carroll	--	1
Chicot	--	4
Clark	--	1
Clay	--	6
Conway	--	3
Craighead	--	7
Crawford	Fort Smith	4
Crittenden	Memphis	2
Cross	--	7
Desha	--	4
Drew	--	1
Faulkner	--	1
Franklin	--	1
Greene	--	3
Hempstead	--	1
Independence	--	1
Jackson	--	6
Jefferson	Pine Bluff	6
Lafayette	--	1
Lawrence	--	4
Lee	--	3

State County	SMSA	Number of Elevators
ARKANSAS (cont.)		
Little River	--	1
Lonoke	--	5
Miller	Texarkana	2
Mississippi	--	7
Monroe	--	6
Phillips	--	14
Poinsett	--	5
Pope	--	2
Prairie	--	4
Pulaski	Little Rock-North Little Rock	3
Randolph	--	3
St. Francis	--	3
Washington	--	1
White	--	5
Woodruff	--	9
CALIFORNIA		
Alameda	San Francisco-Oakland	2
Butte	--	5
Colusa	--	9
Contra Costa	San Francisco-Oakland	1
Fresno	Fresno	6
Glenn	--	3
Imperial	--	7
Kern	Bakersfield	3
Kings	--	5

State County	SMSA	Number of Elevators
CALIFORNIA (cont.)		
Los Angeles	Los Angeles-Long Beach	10
Monterey	--	9
Orange	Anaheim-Santa Ana-Garden Grove	2
Riverside	San Bernardino-Riverside-Ontario	2
Sacramento	Sacramento	1
San Bernardino	San Bernardino-Riverside-Ontario	1
San Diego	San Diego	1
San Francisco	San Francisco-Oakland	3
San Joaquin	Stockton	4
San Luis Obispo	--	2
Solano	Vallejo-Napa	5
Stanislaus	--	4
Sutter	--	3
Tulare	--	1
Ventura	Oxnard-Ventura	1
Yolo	Sacramento	16
Yuba	--	1
COLORADO		
Adams	Denver	9
Arapahoe	Denver	5
Baca	--	11
Bent	--	3
Boulder	--	1
Cheyenne	--	5
Costilla	--	1

State County	SMSA	Number of Elevators
COLORADO (cont.)		
Crowley	--	2
Delta	--	1
Denver	Denver	9
Dolores	--	6
Douglas	--	1
Elbert	--	4
Kiowa	--	10
Kit Carson	--	13
La Plata	--	2
Larimer	--	3
Lincoln	--	7
Logan	--	8
Mesa	--	1
Montezuma	--	5
Montrose	--	3
Morgan	--	9
Otero	--	5
Phillips	--	5
Prowers	--	11
Routt	--	1
Sedgwick	--	5
Washington	--	9
Weld	--	28
Yuma	--	8

State County	SMSA	Number of Elevators
CONNECTICUT		
Hartford	Hartford-New Britain	1
New London	--	1
DELAWARE		
Kent	--	1
Sussex	--	4
FLORIDA		
Bradford	--	1
Jackson	--	1
Walton	--	1
GEORGIA		
Ben Hill	--	1
Brooks	--	1
Bulloch	--	2
Burke	--	3
Chatham	Savannah	1
Clarke	--	1
Coffee	--	1
Colquitt	--	2
Decatur	--	1
Dooly	--	2
Floyd	--	1
Fulton	Atlanta	1
Grady	--	1
Hart	--	1

State County	SMSA	Number of Elevators
GEORGIA (cont.)		
Irwin	--	1
Jefferson	--	1
Macon	--	2
Madison	--	1
Mitchell	--	1
Peach	--	2
Pulaski	--	3
Richmond	Augusta	1
Screven	--	3
Seminole	--	1
Terrell	--	2
Thomas	--	1
Tift	--	1
Toombs	--	1
Washington	--	2
Wheeler	--	1
Whitfield	--	1
Worth	--	1
HAWAII		
Honolulu	Honolulu	1
IDAHO		
Bannock	--	5
Bear Lake	--	2
Benewah	--	4

State County	SMSA	Number of Elevators
IDAHO (cont.)		
Bingham	--	4
Bonner	--	1
Bonneville	--	8
Boundary	--	3
Camas	--	4
Canyon	--	3
Caribou	--	9
Cassia	--	7
Clearwater	--	1
Franklin	--	3
Fremont	--	11
Gooding	--	3
Idaho	--	8
Jefferson	--	5
Jerome	--	11
Kootenai	--	4
Latah	--	16
Lewis	--	9
Lincoln	--	2
Madison	--	3
Minidoka	--	8
Nez Perce	--	10
Oneida	--	4
Power	--	7
Teton	--	3

State County	SMSA	Number of Elevators
IDAHO (cont.)		
Twin Falls	--	26
Washington	--	4
ILLINOIS		
Adams	--	6
Alexander	--	3
Bond	--	4
Boone	Rockford	4
Brown	--	2
Bureau	--	25
Calhoun	--	1
Carroll	--	3
Cass	--	9
Champaign	Champaign-Urbana	45
Christian	--	25
Clark	--	4
Clay	--	5
Clinton	--	2
Coles	--	17
Cook	Chicago	16
Crawford	--	2
Cumberland	--	2
DeKalb	--	10
DeWitt	--	18
Douglas	--	20
DuPage	Chicago	1

State County	SMSA	Number of Elevators
ILLINOIS (cont.)		
Edgar	--	18
Edwards	--	2
Effingham	--	6
Fayette	--	6
Ford	--	21
Franklin	--	2
Fulton	--	11
Gallatin	--	2
Greene	--	8
Grundy	--	15
Hancock	--	14
Henderson	--	7
Henry	Davenport-Rock Island-Moline	15
Iroquois	--	47
Jackson	--	6
Jasper	--	8
Jefferson	--	3
Jersey	--	3
Jo Daviess	--	1
Kane	Chicago	5
Kankakee	--	23
Kendall	--	8
Knox	--	18
LaSalle	--	45
Lawrence	--	3

State County	SMSA	Number of Elevators
ILLINOIS (cont.)		
Lee	--	23
Livingston	--	44
Logan	--	32
McDonough	--	15
McHenry	Chicago	3
McLean	Bloomington-Normal	53
Macon	Decatur	25
Macoupin	--	13
Madison	St. Louis	14
Marion	--	6
Marshall	--	10
Mason	--	15
Massac	--	1
Menard	--	9
Mercer	--	8
Monroe	--	5
Montgomery	--	14
Morgan	--	14
Moultrie	--	13
Ogle	--	4
Peoria	Peoria	13
Perry	--	1
Piatt	--	25
Pike	--	7
Pulaski	--	1

State County	SMSA	Number of Elevators
ILLINOIS (cont.)		
Putnam	--	6
Randolph	--	5
Richland	--	1
Rock Island	Davenport-Rock Island-Moline	3
St. Clair	St. Louis	10
Saline	--	1
Sangamon	Springfield	34
Schuyler	--	3
Scott	--	5
Shelby	--	11
Stark	--	12
Stephenson	--	5
Tazewell	Peoria	17
Union	--	1
Vermilion	--	30
Wabash	--	2
Warren	--	17
Washington	--	4
Whiteside	--	15
Will	Chicago	21
Winnebago	Davenport-Rock Island-Moline	3
Woodford	Peoria	21
INDIANA		
Adams	--	4
Allen	Fort Wayne	9

State County	SMSA	Number of Elevators
INDIANA (cont.)		
Bartholomew	--	1
Benton	--	19
Blackford	--	1
Boone	--	1
Carroll	--	8
Cass	--	6
Clay	Terre Haute	3
Clinton	--	13
Daviess	--	4
Dearborn	Cincinnati	1
Decatur	--	3
DeKalb	--	5
Delaware	Muncie	10
Dubois	--	1
Elkhart	--	2
Fayette	--	1
Fountain	--	5
Fulton	--	6
Gibson	--	4
Grant	--	5
Greene	--	2
Hamilton	Indianapolis	3
Hancock	Indianapolis	4
Hendricks	Indianapolis	1
Henry	--	8

State County	SMSA	Number of Elevators
INDIANA (cont.)		
Howard	--	5
Huntington	--	5
Jackson	--	2
Jasper	--	8
Jay	--	4
Jennings	--	1
Johnson	Indianapolis	1
Knox	--	4
Kosciusko	--	4
Lagrange	--	2
Lake	Gary-Hammond-East Chicago	5
LaPorte	--	8
Lawrence	--	1
Madison	Anderson	10
Marion	Indianapolis	5
Marshall	South Bend	8
Miami	--	11
Montgomery	--	3
Morgan	Indianapolis	2
Newton	--	12
Noble	--	6
Orange	--	1
Parke	--	3
Porter	Gary-Hammond-East Chicago	5
Posey	--	1

State County	SMSA	Number of Elevators
INDIANA (cont.)		
Pulaski	--	7
Putnam	--	2
Randolph	--	3
Rush	--	3
St. Joseph	South Bend	5
Scott	--	2
Shelby	Indianapolis	5
Spencer	--	3
Starke	--	3
Steuben	--	2
Sullivan	Terre Haute	7
Tippecanoe	--	10
Tipton	--	5
Vanderburgh	Evansville	1
Vermillion	Terre Haute	2
Vigo	Terre Haute	2
Wabash	--	7
Warren	--	11
Warrick	Evansville	1
Washington	--	2
Wayne	--	5
Wells	--	1
White	--	10
Whitley	--	6

State County	SMSA	Number of Elevators
IOWA		
Adair	--	6
Adams	--	4
Allamakee	--	2
Appanoose	--	4
Audubon	--	4
Benton	--	16
Black Hawk	Waterloo	12
Boone	--	14
Bremer	--	7
Buchanan	--	13
Buena Vista	--	17
Butler	--	14
Calhoun	--	25
Carroll	--	19
Cass	--	5
Cedar	--	8
Cerro Gordo	--	17
Cherokee	--	12
Chickasaw	--	10
Clarke	--	2
Clay	--	14
Clayton	--	6
Clinton	--	5
Crawford	--	8
Dallas	--	16

State County	SMSA	Number of Elevators
IOWA (cont.)		
Davis	--	5
Decatur	--	1
Delaware	--	4
Des Moines	Des Moines	8
Dickinson	--	9
Dubuque	Dubuque	3
Emmet	--	11
Fayette	--	12
Floyd	--	9
Franklin	--	14
Fremont	--	20
Greene	--	16
Grundy	--	14
Guthrie	--	10
Hamilton	--	15
Hancock	--	13
Hardin	--	21
Harrison	--	16
Henry	--	9
Howard	--	8
Humboldt	--	15
Ida	--	8
Iowa	--	10
Jackson	--	2
Jasper	--	16

State County	SMSA	Number of Elevators
IOWA (cont.)		
Jefferson	--	8
Johnson	--	6
Jones	--	2
Keokuk	--	7
Kossuth	--	21
Lee	--	7
Linn	Cedar Rapids	16
Louisa	--	5
Lucas	--	3
Lyon	--	13
Madison	--	9
Mahaska	--	7
Marion	--	12
Marshall	--	21
Mills	--	11
Mitchell	--	9
Monona	--	14
Monroe	--	1
Montgomery	--	8
Muscatine	--	9
O'Brien	--	16
Osceola	--	8
Page	--	13
Palo Alto	--	13
Plymouth	--	13

State County	SMSA	Number of Elevators
IOWA (cont.)		
Pocahontas	--	15
Polk	Des Moines	25
Pottawattamie	Omaha	17
Poweshiek	--	12
Ringgold	--	3
Sac	--	14
Scott	Davenport-Rock Island-Moline	8
Shelby	--	16
Sioux	--	17
Story	--	22
Tama	--	20
Taylor	--	10
Union	--	5
Van Buren	--	3
Wapello	--	7
Warren	--	7
Washington	--	11
Wayne	--	4
Webster	--	25
Winnebago	--	12
Winneshiek	--	3
Woodbury	Sioux City	21
Worth	--	7
Wright	--	17

State County	SMSA	Number of Elevators
KANSAS		
Allen	--	8
Anderson	--	6
Atchison	--	11
Barber	--	12
Barton	--	29
Bourbon	--	5
Brown	--	15
Butler	Wichita	13
Chase	--	2
Chautauqua	--	1
Cherokee	--	9
Cheyenne	--	8
Clark	--	11
Clay	--	11
Cloud	--	17
Coffey	--	8
Comanche	--	6
Cowley	--	15
Crawford	--	8
Decatur	--	14
Dickinson	--	24
Doniphan	--	7
Douglas	--	5
Edwards	--	6
Ellis	--	13

State County	SMSA	Number of Elevators
KANSAS (cont.)		
Ellsworth	--	8
Finney	--	13
Ford	--	19
Franklin	--	5
Geary	--	5
Gove	--	12
Graham	--	8
Grant	--	10
Gray	--	12
Greeley	--	8
Greenwood	--	4
Hamilton	--	6
Harper	--	18
Harvey	--	16
Haskell	--	6
Hodgeman	--	7
Jackson	--	7
Jefferson	--	5
Jewell	--	11
Johnson	Kansas City	8
Kearny	--	3
Kingman	--	16
Kiowa	--	8
Labette	--	11
Lane	--	11

State County	SMSA	Number of Elevators
KANSAS (cont.)		
Leavenworth	--	3
Lincoln	--	18
Linn	--	4
Logan	--	11
Lyon	--	10
McPherson	--	26
Marion	--	19
Marshall	--	23
Meade	--	10
Miami	--	8
Mitchell	--	22
Montgomery	--	9
Morris	--	7
Morton	--	10
Nemaha	--	11
Neosho	--	13
Ness	--	12
Norton	--	10
Osage	--	7
Osborne	--	10
Ottawa	--	13
Pawnee	--	10
Phillips	--	13
Pottawatomie	--	8
Pratt	--	13

State County	SMSA	Number of Elevators
KANSAS (cont.)		
Rawlins	--	13
Reno	--	37
Republic	--	17
Rice	--	16
Riley	--	7
Rooks	--	16
Rush	--	14
Russell	--	15
Saline	--	19
Scott	--	11
Sedgwick	Wichita	29
Seward	--	7
Shawnee	Topeka	13
Sheridan	--	8
Sherman	--	9
Smith	--	12
Stafford	--	15
Stanton	--	10
Stevens	--	12
Sumner	--	42
Thomas	--	19
Trego	--	9
Wabaunsee	--	6
Wallace	--	4
Washington	--	13

State County	SMSA	Number of Elevators
KANSAS (cont.)		
Wichita	--	12
Wilson	--	4
Woodson	--	3
Wyandotte	Kansas City	11
KENTUCKY		
Calloway	--	1
Christian	--	3
Daviess	--	3
Harrison	--	1
Henderson	Evansville	1
Hopkins	--	1
Jefferson	Louisville	3
Simpson	--	1
Todd	--	2
Union	--	2
Webster	--	1
LOUISIANA		
Acadia	--	11
Allen	--	2
Avoyelles	--	1
Caddo	Shreveport	1
Calcasieu	Lakes Charles	6
Catahoula	--	3
East Carroll	--	3
Evangeline	--	3

State County	SMSA	Number of Elevators
LOUISIANA (cont.)		
Franklin	--	2
Jefferson	New Orleans	2
Jefferson Davis	--	14
Morehouse	--	2
Orleans	New Orleans	1
Ouachita	Monroe	2
Plaquemines	--	1
Pointe Coupee	--	1
Rapides	--	3
Richland	--	2
St. Charles	--	3
St. Landry	--	4
Tangipahoa	--	2
Tensas	--	1
Union	--	1
Vermilion	--	10
West Baton Rouge	--	1
West Carroll	--	1
MAINE		
Aroostook	--	1
MARYLAND		
Baltimore	Baltimore	4
Frederick	--	2
Somerset	--	1
Washington	--	1

State County	SMSA	Number of Elevators
MARYLAND (cont.)		
Wicomico	--	1
Worcester	--	1
MASSACHUSETTS		
Hampden	--	1
Worcester	--	1
MICHIGAN		
Allegan	--	3
Antrim	--	1
Arenac	--	3
Barry	--	5
Bay	Bay City	12
Berrien	--	4
Branch	--	3
Calhoun	--	4
Cass	--	4
Charlevoix	--	1
Chippewa	--	2
Clinton	Lansing	6
Delta	--	2
Eaton	Lansing	9
Genesee	Flint	7
Grand Traverse	--	2
Gratiot	--	13
Hillsdale	--	4
Huron	--	26

State County	SMSA	Number of Elevators
MICHIGAN (cont.)		
Ingham	Lansing	6
Ionia	--	5
Isabella	--	5
Jackson	Jackson	2
Kalamazoo	Kalamazoo	8
Kent	Grand Rapids	7
Lapeer	Flint	4
Leelanau	--	1
Lenawee	--	7
Livingston	--	8
Macomb	Detroit	4
Manistee	--	1
Mecosta	--	2
Menominee	--	1
Midland	--	1
Missaukee	--	2
Monroe	Toledo	4
Montcalm	--	9
Muskegon	Muskegon-Muskegon Heights	1
Newaygo	--	2
Oakland	Detroit	2
Oceana	--	1
Ogemaw	--	1
Osceola	--	1
Ottawa	Grand Rapids	4

State County	SMSA	Number of Elevators
MICHIGAN (cont.)		
Presque Isle	--	1
Saginaw	Saginaw	20
St. Clair	--	7
St. Joseph	--	7
Sanilac	--	16
Shiawassee	--	9
Tuscola	--	22
Van Buren	--	4
Washtenaw	Ann Arbor	4
Wayne	Detroit	1
MINNESOTA		
Aitkin	--	1
Anoka	Minneapolis-St. Paul	3
Becker	--	4
Beltrami	--	1
Benton	--	1
Big Stone	--	14
Blue Earth	--	23
Brown	--	17
Carlton	--	4
Carver	--	2
Chippewa	--	11
Chisago	--	3
Clay	Fargo-Moorhead	18
Clearwater	--	3

State County	SMSA	Number of Elevators
MINNESOTA (cont.)		
Cottonwood	--	9
Crow Wing	--	1
Dakota	Minneapolis-St. Paul	11
Dodge	--	8
Douglas	--	6
Faribault	--	19
Fillmore	--	5
Freeborn	--	14
Goodhue	--	14
Grant	--	11
Hennepin	Minneapolis-St. Paul	34
Houston	--	2
Hubbard	--	1
Isanti	--	3
Itasca	--	1
Jackson	--	9
Kanabec	--	3
Kandiyohi	--	18
Kittson	--	16
Lac qui Parle	--	12
Lake of the Woods	--	3
Le Sueur	--	11
Lincoln	--	8
Lyon	--	17
McLeod	--	7

State County	SMSA	Number of Elevators
MINNESOTA (cont.)		
Mahnomen	--	4
Marshall	--	19
Martin	--	17
Meeker	--	9
Mille Lacs	--	4
Morrison	--	1
Mower	--	12
Murray	--	11
Nicollet	--	7
Nobles	--	20
Norman	--	12
Olmsted	--	4
Otter Tail	--	16
Pennington	--	6
Pine	--	7
Pipestone	--	10
Polk	--	30
Pope	--	7
Ramsey	Minneapolis-St. Paul	6
Red Lake	--	6
Redwood	--	21
Renville	--	16
Rice	--	9
Rock	--	9
Roseau	--	7

State County	SMSA	Number of Elevators
MINNESOTA (cont.)		
St. Louis	Duluth-Superior	9
Scott	--	9
Sherburne	--	2
Sibley	--	7
Stearns	--	9
Steele	--	8
Stevens	--	8
Swift	--	11
Todd	--	2
Traverse	--	8
Wabasha	--	10
Wadena	--	3
Waseca	--	10
Watonwan	--	14
Wilkin	--	16
Winona	--	6
Wright	--	9
Yellow Medicine	--	9
MISSISSIPPI		
Adams	--	1
Attala	--	1
Bolivar	--	4
Chickasaw	--	3
Clay	--	1
Coahoma	--	4

State County	SMSA	Number of Elevators
MISSISSIPPI (cont.)		
Hinds	Jackson	1
Humphreys	--	1
Issaquena	--	2
Jackson	--	1
Lee	--	1
Leflore	--	4
Lowndes	--	1
Madison	--	1
Noxubee	--	1
Panola	--	1
Pike	--	1
Pontotoc	--	1
Quitman	--	3
Sharkey	--	2
Sunflower	--	6
Tunica	--	4
Washington	--	5
Zazoo	--	3
MISSOURI		
Adair	--	1
Andrew	--	2
Atchison	--	12
Audrain	--	8
Barry	--	5
Barton	--	6

State County	SMSA	Number of Elevators
MISSOURI (cont.)		
Bates	--	3
Benton	--	4
Bollinger	--	1
Boone	--	4
Buchanan	St. Joseph	12
Butler	--	4
Caldwell	--	2
Callaway	--	4
Camden	--	1
Cape Girardeau	--	5
Carroll	--	9
Carter	--	1
Cass	Kansas City	3
Cedar	--	1
Chariton	--	9
Christian	--	4
Clark	--	5
Clay	Kansas City	10
Clinton	--	3
Cole	--	8
Cooper	--	4
Crawford	--	2
Dade	--	3
Dallas	--	3
Daviess	--	6

State County	SMSA	Number of Elevators
MISSOURI (cont.)		
DeKalb	--	1
Dent	--	1
Douglas	--	1
Dunklin	--	10
Franklin	St. Louis	8
Gasconade	--	2
Gentry	--	4
Greene	Springfield	6
Grundy	--	5
Harrison	--	5
Henry	--	6
Hickory	--	1
Holt	--	11
Howard	--	4
Howell	--	4
Jackson	Kansas City	12
Jasper	--	2
Jefferson	St. Louis	1
Johnson	--	6
Knox	--	2
Laclede	--	2
Lafayette	--	9
Lawrence	--	6
Lewis	--	8
Lincoln	--	8

State County	SMSA	Number of Elevators
MISSOURI (cont.)		
Linn	--	6
Livingston	--	3
Macon	--	9
Madison	--	2
Maries	--	1
Marion	--	3
Mercer	--	3
Miller	--	4
Mississippi	--	10
Moniteau	--	6
Monroe	--	4
Montgomery	--	5
Morgan	--	3
New Madrid	--	8
Newton	--	1
Nodaway	--	11
Oregon	--	2
Osage	--	4
Pemiscot	--	6
Perry	--	3
Pettis	--	1
Phelps	--	2
Pike	--	3
Platte	Kansas City	2
Polk	--	7

State County	SMSA	Number of Elevators
MISSOURI (cont.)		
Pulaski	--	2
Putnam	--	3
Ralls	--	4
Randolph	--	2
Ray	--	8
Reynolds	--	1
Ripley	--	3
St. Charles	St. Louis	4
St. Clair	--	1
St. Francois	--	2
St. Louis	St. Louis	8
Ste. Genevieve	--	3
Saline	--	12
Schuyler	--	5
Scotland	--	2
Scott	--	12
Shannon	--	2
Shelby	--	4
Stoddard	--	11
Stone	--	2
Sullivan	--	5
Taney	--	1
Texas	--	4
Vernon	--	2
Warren	--	5

State County	SMSA	Number of Elevators
MISSOURI (cont.)		
Webster	--	6
Worth	--	2
Wright	--	4
MONTANA		
Beaverhead	--	1
Big Horn	--	4
Blaine	--	3
Broadwater	--	2
Carbon	--	9
Cascade	Great Falls	18
Chouteau	--	31
Custer	--	4
Daniels	--	10
Dawson	--	8
Fallon	--	3
Fergus	--	23
Flathead	--	3
Gallatin	--	16
Glacier	--	4
Golden Valley	--	1
Hill	--	21
Judith Basin	--	12
Lake	--	3
Liberty	--	10
McCone	--	3

State County	SMSA	Number of Elevators
MONTANA (cont.)		
Madison	--	1
Meagher	--	1
Missoula	--	1
Musselshell	--	3
Park	--	4
Petroleum	--	1
Phillips	--	9
Pondera	--	15
Prairie	--	3
Richland	--	9
Roosevelt	--	14
Rosebud	--	1
Sheridan	--	15
Stillwater	--	7
Sweet Grass	--	1
Teton	--	16
Toole	--	13
Treasure	--	1
Valley	--	12
Wheatland	--	2
Wibaux	--	3
Yellowstone	Billings	12
NEBRASKA		
Adams	--	20
Antelope	--	9

State County	SMSA	Number of Elevators
NEBRASKA (cont.)		
Boone	--	10
Box Butte	--	10
Boyd	--	3
Brown	--	1
Buffalo	--	24
Burt	--	11
Butler	--	18
Cass	--	24
Cedar	--	11
Chase	--	7
Cherry	--	4
Cheyenne	--	14
Clay	--	23
Colfax	--	12
Cuming	--	9
Custer	--	15
Dakota	Sioux City	5
Dawes	--	4
Dawson	--	17
Deuel	--	3
Dixon	--	7
Dodge	--	24
Douglas	Omaha	19
Dundy	--	6
Fillmore	--	20

State County	SMSA	Number of Elevators
NEBRASKA (cont.)		
Franklin	--	7
Frontier	--	7
Furnas	--	12
Gage	--	21
Garden	--	4
Garfield	--	1
Gosper	--	2
Greeley	--	4
Hall	--	15
Hamilton	--	10
Harlan	--	8
Hayes	--	2
Hitchcock	--	9
Holt	--	3
Howard	--	8
Jefferson	--	12
Johnson	--	8
Kearney	--	10
Keith	--	6
Kimball	--	7
Knox	--	10
Lancaster	Lincoln	32
Lincoln	--	9
Logan	--	1
Madison	--	12
Merrick	--	13

State County	SMSA	Number of Elevators
NEBRASKA (cont.)		
Morrill	--	8
Nance	--	5
Nemaha	--	12
Nuckolls	--	15
Otoe	--	21
Pawnee	--	11
Perkins	--	11
Phelps	--	9
Pierce	--	10
Platte	--	13
Polk	--	9
Red Willow	--	11
Richardson	--	11
Rock	--	1
Saline	--	11
Sarpy	--	3
Saunders	--	27
Scotts Bluff	--	16
Seward	--	18
Sheridan	--	10
Sherman	--	9
Stanton	--	4
Thayer	--	19
Thurston	--	10
Valley	--	8
Washington	--	7

State County	SMSA	Number of Elevators
NEBRASKA (cont.)		
Wayne	--	7
Webster	--	9
York	--	15
NEVADA		
Elko	--	1
NEW JERSEY		
Hunterdon	--	1
Warren	Allentown-Bethlehem-Easton	1
NEW MEXICO		
Chaves	--	1
Curry	--	10
De Baca	--	1
Dona Ana	--	2
Eddy	--	1
Grant	--	1
Lea	--	2
Quay	--	6
Roosevelt	--	3
Torrance	--	1
Union	--	1
NEW YORK		
Albany	Albany-Schenectady-Troy	1
Allegany	--	1
Broome	Binghamton	1

State County	SMSA	Number of Elevators
NEW YORK (cont.)		
Cayuga	--	5
Erie	Buffalo	11
Genesee	--	1
Herkimer	Utica-Rome	1
Livingston	Rochester	6
Monroe	Rochester	7
Niagara	Buffalo	2
Onondaga	Syracuse	1
Ontario	--	10
Orleans	Rochester	1
St. Lawrence	--	1
Seneca	--	2
Tompkins	--	4
Wayne	Rochester	5
Wyoming	--	3
Yates	--	4
NORTH CAROLINA		
Beaufort	--	2
Camden	--	1
Craven	--	1
Duplin	--	1
Durham	Durham	1
Edgecombe	--	2
Iredell	--	1
Johnston	--	2

State County	SMSA	Number of Elevators
NORTH CAROLINA (cont.)		
Jones	--	1
Nash	--	1
Pasquotank	--	2
Pitt	--	3
Robeson	--	2
Wake	Raleigh	1
Wayne	--	2
Wilson	--	2
NORTH DAKOTA		
Adams	--	7
Barnes	--	24
Bottineau	--	24
Bowman	--	8
Burke	--	12
Burleigh	--	13
Cass	Fargo-Moorhead	43
Cavalier	--	25
Dickey	--	11
Divide	--	10
Dunn	--	6
Eddy	--	7
Emmons	--	12
Foster	--	9
Golden Valley	--	6
Grand Forks	--	27

State County	SMSA	Number of Elevators
NORTH DAKOTA (cont.)		
Grant	--	9
Griggs	--	10
Hettinger	--	12
Kidder	--	9
La Moure	--	18
Logan	--	9
McHenry	--	23
McIntosh	--	11
McKenzie	--	10
McLean	--	16
Mercer	--	7
Morton	--	14
Mountrail	--	19
Nelson	--	19
Oliver	--	1
Pembina	--	22
Pierce	--	11
Ramsey	--	24
Ransom	--	8
Renville	--	12
Richland	--	25
Rolette	--	13
Sargent	--	15
Sheridan	--	6
Sioux	--	4

State County	SMSA	Number of Elevators
NORTH DAKOTA (cont.)		
Stark	--	13
Steele	--	8
Stutsman	--	26
Towner	--	16
Traill	--	21
Walsh	--	22
Ward	--	27
Wells	--	22
Williams	--	25
OHIO		
Adams	--	3
Allen	Lima	11
Ashland	--	3
Ashtabula	--	5
Athens	--	3
Auglaize	--	11
Belmont	Wheeling	4
Brown	--	3
Butler	Hamilton-Middletown	6
Carroll	--	3
Champaign	--	8
Clark	Springfield	3
Clermont	Cincinnati	5
Clinton	--	8
Columbiana	--	3

State County	SMSA	Number of Elevators
OHIO (cont.)		
Coshocton	--	2
Crawford	--	8
Cuyahoga	Cleveland	5
Darke	--	7
Defiance	--	7
Delaware	Columbus	10
Erie	--	4
Fairfield	--	2
Fayette	--	3
Franklin	Columbus	15
Fulton	--	5
Gallia	--	1
Geauga	Cleveland	2
Greene	Dayton	5
Guernsey	--	3
Hamilton	Cincinnati	5
Hancock	--	13
Hardin	--	5
Harrison	--	1
Henry	--	10
Highland	--	10
Hocking	--	2
Holmes	--	5
Huron	--	7
Jackson	--	1

State County	SMSA	Number of Elevators
OHIO (cont.)		
Jefferson	Steubenville-Wierton	3
Knox	--	3
Lake	Cleveland	1
Lawrence	Huntington-Ashland	1
Licking	--	4
Logan	--	7
Lorain	Lorain-Elyria	5
Lucas	Toledo	9
Madison	--	7
Mahoning	Youngstown-Warren	2
Marion	--	11
Medina	Cleveland	3
Meigs	--	1
Mercer	--	9
Miami	Dayton	9
Monroe	--	2
Montgomery	Dayton	6
Morgan	--	3
Morrow	--	2
Muskingum	--	3
Noble	--	1
Ottawa	--	9
Paulding	--	11
Perry	--	2
Pickaway	Columbus	5

State County	SMSA	Number of Elevators
OHIO (cont.)		
Pike	--	2
Portage	Akron	2
Preble	Dayton	5
Putnam	--	9
Richland	--	8
Ross	--	4
Sandusky	--	10
Scioto	--	2
Seneca	--	12
Shelby	--	8
Stark	Canton	6
Summit	Akron	1
Trumbull	Youngstown-Warren	3
Tuscarawas	--	8
Union	--	2
Van Wert	--	14
Warren	Cincinnati	4
Washington	--	2
Wayne	--	8
Williams	--	5
Wood	Toledo	15
Wyandot	--	10
OKLAHOMA		
Alfalfa	--	14
Beaver	--	6

State County	SMSA	Number of Elevators
OKLAHOMA (cont.)		
Beckham	--	4
Blaine	--	17
Bryan	--	1
Caddo	--	8
Canadian	Oklahoma City	12
Cherokee	--	1
Cimarron	--	8
Cleveland	Oklahoma City	1
Comanche	Lawton	2
Cotton	--	3
Craig	--	2
Custer	--	8
Delaware	--	1
Dewey	--	5
Ellis	--	4
Garfield	--	30
Grady	--	11
Grant	--	16
Greer	--	4
Harmon	--	3
Harper	--	4
Haskell	--	1
Hughes	--	1
Jackson	--	13
Jefferson	--	1

State County	SMSA	Number of Elevators
OKLAHOMA (cont.)		
Kay	--	16
Kingfisher	--	8
Kiowa	--	11
Le Flore	Fort Smith	1
Logan	--	12
McCurtain	--	2
Major	--	10
Murray	--	1
Muskogee	--	3
Noble	--	8
Oklahoma	Oklahoma City	2
Ottawa	--	3
Pawnee	--	1
Payne	--	5
Pittsburgh	--	2
Pottawatomie	--	1
Roger Mills	--	2
Rogers	--	2
Texas	--	15
Tillman	--	10
Tulsa	Tulsa	2
Wagoner	--	1
Washita	--	6
Woods	--	13
Woodward	--	5

State County	SMSA	Number of Elevators
OREGON		
Baker	--	3
Clatsop	--	1
Deschutes	--	1
Gilliam	--	4
Jefferson	--	2
Klamath	--	3
Lake	--	1
Malheur	--	1
Marion	Salem	1
Morrow	--	9
Multnomah	Portland	6
Polk	Salem	4
Sherman	--	13
Umatilla	--	34
Union	--	11
Wallowa	--	4
Wasco	--	7
Washington	Portland	3
Yamhill	--	3
PENNSYLVANIA		
Adams	York	1
Berks	Reading	1
Blair	Altoona	2
Franklin	--	1
Lancaster	Lancaster	3

State County	SMSA	Number of Elevators
PENNSYLVANIA (cont.)		
Lycoming	--	1
Mercer	--	1
Philadelphia	Philadelphia	2
Union	--	1
SOUTH CAROLINA		
Allendale	--	3
Anderson	--	1
Barnwell	--	3
Berkeley	Charleston	3
Charleston	Charleston	1
Darlington	--	2
Florence	--	1
Hampton	--	6
Jasper	--	1
Lancaster	--	2
Lexington	Columbia	2
Marion	--	1
Orangeburg	--	3
Pickens	Greenville	1
Sumter	--	2
SOUTH DAKOTA		
Aurora	--	6
Beadle	--	16
Bennett	--	1
Bon Homme	--	8

State County	SMSA	Number of Elevators
SOUTH DAKOTA (cont.)		
Brookings	--	10
Brown	--	32
Brule	--	4
Butte	--	2
Campbell	--	3
Charles Mix	--	9
Clark	--	11
Clay	--	4
Codington	--	13
Corson	--	9
Custer	--	1
Davison	--	5
Day	--	15
Deuel	--	10
Dewey	--	9
Douglas	--	6
Edmunds	--	14
Fall River	--	1
Faulk	--	15
Grant	--	6
Gregory	--	8
Haakon	--	4
Hamlin	--	7
Hand	--	5
Hanson	--	8
Hughes	--	3

State County	SMSA	Number of Elevators
SOUTH DAKOTA (cont.)		
Hutchinson	--	12
Hyde	--	3
Jackson	--	4
Jerauld	--	6
Jones	--	3
Kingsbury	--	14
Lake	--	10
Lawrence	--	1
Lincoln	--	9
Lyman	--	6
McCook	--	6
McPherson	--	9
Marshall	--	11
Meade	--	4
Mellette	--	2
Miner	--	7
Minnehaha	Sioux Falls	16
Moody	--	7
Pennington	--	6
Perkins	--	4
Potter	--	8
Roberts	--	14
Sanborn	--	6
Spink	--	19
Stanley	--	1
Sully	--	5

State County	SMSA	Number of Elevators
SOUTH DAKOTA (cont.)		
Tripp	--	7
Turner	--	14
Union	--	6
Walworth	--	8
Yankton	--	8
Ziebach	--	2
TENNESSEE		
Davidson	Nashville	3
Dyer	--	4
Gibson	--	2
Hamilton	Chattanooga	2
Henry	--	1
Knox	Knoxville	1
Lake	--	3
Lauderdale	--	1
Lincoln	--	1
Loudon	--	1
Madison	--	1
Maury	--	1
Obion	--	2
Rutherford	--	1
Shelby	Memphis	7
Weakley	--	1
Williamson	--	1

State County	SMSA	Number of Elevators
TEXAS		
Armstrong	--	3
Atascosa	--	2
Austin	--	1
Bailey	--	9
Bastrop	--	1
Baylor	--	3
Bee	--	3
Bell	--	5
Bexar	San Antonio	3
Bosque	--	2
Bowie	Texarkana	2
Brazoria	Houston	4
Brazos	--	5
Briscoe	--	3
Brown	--	2
Burnet	--	1
Caldwell	--	2
Calhoun	--	5
Callahan	--	1
Cameron	Brownsville-Harlingen-San Benito	6
Carson	--	13
Castro	--	15
Chambers	--	8
Childress	--	1
Cochran	--	8

State County	SMSA	Number of Elevators
TEXAS (cont.)		
Coleman	--	3
Collin	Dallas	8
Collingsworth	--	4
Colorado	--	10
Comal	--	2
Comanche	--	1
Concho	--	1
Cooke	--	1
Coryell	--	2
Cottle	--	1
Crosby	--	4
Dallam	--	6
Dallas	Dallas	11
Dawson	--	4
Deaf Smith	--	6
Delta	--	2
Denton	Dallas	5
DeWitt	--	1
Dickens	--	2
Donley	--	2
Ellis	Dallas	7
Erath	--	1
Falls	--	2
Fannin	--	3
Fayette	--	1

State County	SMSA	Number of Elevators
TEXAS (cont.)		
Floyd	--	17
Foard	--	3
Fort Bend	Houston	6
Gaines	--	5
Galveston	Galveston-Texas City	2
Garza	--	1
Gillespie	--	1
Goliad	--	1
Gonzales	--	2
Gray	--	9
Grayson	--	5
Grimes	--	3
Guadalupe	San Antonio	6
Hale	--	36
Hall	--	2
Hansford	--	13
Hardeman	--	10
Hardin	--	1
Harris	Houston	31
Hartley	--	3
Haskell	--	1
Hays	--	2
Hemphill	--	1
Hill	--	5
Hockley	--	19
Hunt	--	2

State County	SMSA	Number of Elevators
TEXAS (cont.)		
Hutchinson	--	4
Jackson	--	8
Jefferson	Beaumont-Port Arthur-Orange	14
Jim Wells	--	4
Johnson	Fort Worth	5
Jones	Abilene	4
Karnes	--	2
Kaufman	--	2
Kleberg	--	2
Knox	--	4
Lamar	--	2
Lamb	--	17
Lavaca	--	2
Lee	--	1
Leon	--	1
Liberty	Houston	10
Limestone	--	2
Lipscomb	--	5
Live Oak	--	3
Lubbock	Lubbock	44
Lynn	--	9
McCulloch	--	1
McLennan	Waco	11
Matagorda	--	10
Medina	--	4

State County	SMSA	Number of Elevators
TEXAS (cont.)		
Midland	Midland	1
Milam	--	3
Mitchell	--	1
Moore	--	9
Navarro	--	4
Nolan	--	3
Nueces	Corpus Christi	24
Ochiltree	--	9
Oldham	--	9
Orange	Beaumont-Port Arthur-Orange	1
Parker	--	1
Parmer	--	13
Potter	Amarillo	20
Randall	Amarillo	8
Red River	--	2
Refugio	--	5
Roberts	--	1
Robertson	--	1
Rockwall	--	1
Runnels	--	4
San Patricio	Corpus Christi	13
Scurry	--	1
Sherman	--	6
Swisher	--	19
Tarrant	Fort Worth	15

State County	SMSA	Number of Elevators
TEXAS (cont.)		
Taylor	Abilene	3
Terry	--	5
Travis	Austin	1
Uvalde	--	4
Van Zandt	--	1
Victoria	--	2
Waller	--	5
Wharton	--	8
Wheeler	--	6
Wichita	Wichita Falls	13
Wilbarger	--	5
Willacy	--	5
Williamson	--	13
Wise	--	1
Yoakum	--	1
Young	--	3
UTAH		
Box Elder	--	4
Cache	--	2
Iron	--	1
Juab	--	1
Millard	--	2
Salt Lake	Salt Lake City	3
Sevier	--	1
Utah	Provo-Orem	1

State County	SMSA	Number of Elevators
UTAH (cont.)		
Washington	--	1
Weber	Ogden	4
VERMONT		
Franklin	--	1
VIRGINIA		
Buckingham	--	1
Campbell	Lynchburg	1
Henrico	Richmond	2
Isle of Wight	--	1
New Kent	--	1
Norfolk	Norfolk-Portsmouth	3
Page	--	1
Roanoke	Roanoke	2
Rockingham	--	1
Southampton	--	2
WASHINGTON		
Adams	--	27
Asotin	--	1
Benton	--	6
Chelan	--	1
Clark	Portland	2
Columbia	--	13
Cowlitz	--	2
Douglas	--	6
Franklin	--	10

State County	SMSA	Number of Elevators
WASHINGTON (cont.)		
Garfield	--	9
Grant	--	28
King	Seattle-Everett	5
Kittitas	--	1
Klickitat	--	4
Lincoln	--	34
Okanogan	--	2
Pierce	Tacoma	2
Spokane	Spokane	28
Stevens	--	3
Walla Walla	--	25
Whitman	--	76
Yakima	--	4
WISCONSIN		
Ashland	--	1
Barron	--	5
Brown	Green Bay	3
Buffalo	--	3
Calumet	--	3
Chippewa	--	2
Clark	--	4
Columbia	--	3
Crawford	--	1
Dane	Madison	6
Dodge	--	2

State County	SMSA	Number of Elevators
WISCONSIN (cont.)		
Door	--	2
Douglas	Duluth-Superior	8
Dunn	--	2
Eau Claire	--	3
Fond du Lac	--	2
Grant	--	1
Green	--	2
Green Lake	--	1
Iowa	--	1
Jackson	--	2
Jefferson	--	4
Juneau	--	3
Kenosha	Kenosha	1
Kewaunee	--	1
LaCrosse	--	1
Lafayette	--	1
Langlade	--	1
Lincoln	--	2
Manitowoc	--	11
Marathon	--	7
Marinette	--	1
Milwaukee	Milwaukee	5
Monroe	--	4
Oconto	--	4
Outagamie	--	5

State County	SMSA	Number of Elevators
WISCONSIN (cont.)		
Ozaukee	Milwaukee	1
Pepin	--	2
Pierce	--	4
Polk	--	7
Portage	--	1
Price	--	1
Racine	Racine	3
Richland	--	1
Rock	--	4
Rusk	--	1
St. Croix	--	3
Sauk	--	1
Shawano	--	2
Sheboygan	--	3
Taylor	--	1
Trempealeau	--	4
Vernon	--	2
Walworth	--	3
Washington	--	2
Waukesha	Milwaukee	1
Waupaca	--	5
Winnebago	--	2
Wood	--	1
WYOMING		
Albany	--	1

State County	SMSA	Number of Elevators
WYOMING (cont.)		
Big Horn	--	5
Campbell	--	2
Converse	--	2
Crook	--	1
Fremont	--	3
Goshen	--	5
Johnson	--	2
Laramie	--	6
Lincoln	--	1
Niobrara	--	1
Park	--	4
Platte	--	5
Sheridan	--	6
Washakie	--	2
Weston	--	3

Table F-11. FLOUR MILLS
1966

State County	SMSA	Number of Mills
ALABAMA		
Blount	--	1
Chilton	--	1
Dale	--	1
Henry	--	1
Houston	--	2
Jefferson	Birmingham	1
Lee	--	1
Montgomery	--	1
Talladega	--	1
Tallapoosa	--	1
Tuscaloosa	Tuscaloosa	1
Walker	--	1
ARIZONA		
Maricopa	Phoenix	1
ARKANSAS		
Arkansas	--	1
Pulaski	Little Rock-North Little Rock	1
CALIFORNIA		
Alameda	San Francisco-Oakland	2
Contra Costa	San Francisco-Oakland	1
Los Angeles	Los Angeles-Long Beach	7
Monterey	--	1

State County	SMSA	Number of Mills
CALIFORNIA (cont.)		
Orange	Anaheim-Santa Ana-Garden Grove	3
Sacramento	--	1
San Benito	--	1
San Bernardino	San Bernardino-Riverside-Ontario	1
San Francisco	San Francisco-Oakland	2
San Joaquin	--	2
Solano	--	1
Ventura	Oxnard-Ventura	1
COLORADO		
Denver	Denver	2
La Plata	--	1
Logan	--	1
Mesa	--	1
Montezuma	--	1
Otero	--	1
DELAWARE		
Kent	--	1
New Castle	Wilmington	1
Sussex	--	2
DISTRICT OF COLUMBIA		
The District	Washington	1
FLORIDA		
Dade	Miami	1
Duval	Jacksonville	1

State County	SMSA	Number of Mills
FLORIDA (cont.)		
Gadsden	--	1
Hillsborough	Tampa-St. Petersburg	1
Holmes	--	2
Madison	--	1
Santa Rosa	Pensacola	1
GEORGIA		
Baldwin	--	1
Burke	--	1
Candler	--	1
Carroll	--	1
Clayton	Atlanta	1
Cobb	--	1
Coffee	--	2
Cook	--	1
DeKalb	Atlanta	1
Douglas	--	1
Emanuel	--	3
Floyd	--	1
Forsyth	--	2
Franklin	--	1
Fulton	Atlanta	1
Grady	--	1
Gwinnett	Atlanta	1
Hall	--	1
Hancock	--	2

State County	SMSA	Number of Mills
GEORGIA (cont.)		
Haralson	--	1
Jefferson	--	2
Lamar	--	1
Laurens	--	1
Madison	--	1
Newton	--	1
Paulding	--	2
Richmond	Augusta	1
Seminole	--	1
Spalding	--	1
Tift	--	3
Wilcox	--	2
HAWAII		
Honolulu	Honolulu	2
IDAHO		
Ada	Boise City	1
Cassia	--	1
Lewis	--	1
Oneida	--	1
Twin Falls	--	1
ILLINOIS		
Cass	--	1
Clinton	--	1
Cook	Chicago	6

State County	SMSA	Number of Mills
ILLINOIS (cont.)		
DeKalb	--	1
Edgar	--	1
Effingham	--	1
Jasper	--	1
Kankakee	--	1
Lee	--	1
Macoupin	--	1
Madison	St. Louis	1
Peoria	Peoria	1
Randolph	--	2
St. Clair	St. Louis	1
Sangamon	Springfield	1
Washington	--	1
Will	Chicago	1
INDIANA		
Allen	Fort Wayne	1
Bartholomew	--	1
Daviess	--	1
Decatur	--	1
Fulton	--	1
Greene	--	1
Lagrange	--	1
LaPorte	--	1
Marion	Indianapolis	2
Miami	--	1

State County	SMSA	Number of Mills
INDIANA (cont.)		
Noble	--	1
Posey	--	2
Ripley	--	1
St. Joseph	South Bend	1
Steuben	--	1
Vanderburgh	Evansville	1
IOWA		
Allamakee	--	1
Johnson	--	1
Lee	--	2
Muscatine	--	1
Polk	--	3
Scott	Davenport-Rock Island-Moline	1
KANSAS		
Atchinson	--	1
Barton	--	2
Butler	Wichita	1
Cowley	--	3
Dickinson	--	1
Ford	--	1
Harvey	--	3
Kingman	--	1
Leavenworth	--	1
McPherson	--	3
Montgomery	--	1

State County	SMSA	Number of Mills
KANSAS (cont.)		
Reno	--	2
Saline	--	3
Sedgwick	Wichita	3
Seward	--	1
Shawnee	Topeka	2
Stafford	--	1
Sumner	--	2
Wyandotte	Kansas City	2
KENTUCKY		
Bell	--	1
Bracken	--	1
Calloway	--	1
Christian	--	2
Daviess	--	2
Fayette	Lexington	1
Green	--	1
Henry	--	1
Larue	--	1
Laurel	--	1
Lincoln	--	1
Logan	--	2
Muhlenberg	--	1
Nelson	--	1
Pulaski	--	1
Rockcastle	--	1

State County	SMSA	Number of Mills
KENTUCKY (cont.)		
Shelby	--	2
Spencer	--	1
Warren	--	1
Wayne	--	1
Woodford	--	2
LOUISIANA		
Caddo	Shreveport	1
Madison	--	1
Washington	--	1
MARYLAND		
Baltimore	Baltimore	2
Caroline	--	1
Frederick	--	1
Montgomery	--	1
Washington	--	2
MASSACHUSETTS		
Worcester	--	1
MICHIGAN		
Berrien	--	2
Branch	--	1
Cass	--	1
Hillsdale	--	1
Ionia	--	1
Kalamazoo	Kalamazoo	1
Kent	Grand Rapids	1

State County	SMSA	Number of Mills
MICHIGAN (cont.)		
Macomb	--	2
Monroe	Toledo	1
Ogemaw	--	1
Ottawa	Grand Rapids	1
Saginaw	Saginaw	1
Shiawassee	--	2
Washtenaw	--	1
Wayne	Detroit	2
MINNESOTA		
Brown	--	1
Chisago	--	1
Dakota	Minneapolis-St. Paul	1
Goodhue	--	2
Hennipin	--	5
Itasca	--	1
Le Sueur	--	1
Norman	--	1
Otter Tail	--	1
Ramsey	Minneapolis-St. Paul	3
St. Louis	Duluth-Superior	1
Wabasha	--	2
Winona	--	2
MISSISSIPPI		
Lee	--	1
Newton	--	1

State County	SMSA	Number of Mills
MISSISSIPPI (cont.)		
Webster	--	1
MISSOURI		
Buchanan	St. Joseph	2
Clay	Kansas City	4
Jackson	Kansas City	2
Jasper	--	1
Ozark	--	1
St. Louis	St. Louis	1
Warren	--	1
MONTANA		
Cascade	Great Falls	2
Gallatin	--	1
Yellowstone	Billings	2
NEBRASKA		
Butler	--	1
Dawson	--	1
Dodge	--	1
Douglas	Omaha	3
Hall	--	1
Lancaster	Lincoln	1
Nemaha	--	1
Phelps	--	1
Saline	--	1

State County	SMSA	Number of Mills
NEW JERSEY		
Essex	Newark	1
Passaic	Paterson-Clifton-Passaic	3
NEW MEXICO		
Curry	--	1
Valencia	--	1
NEW YORK		
Albany	Albany-Schenectady-Troy	1
Cayuga	--	2
Columbia	--	1
Erie	Buffalo	6
Genesee	--	2
Kings	New York	1
Monroe	Rochester	3
Niagara	--	1
Onondaga	--	2
Steuben	--	2
Wayne	Rochester	1
Yates	--	1
NORTH CAROLINA		
Alexander	--	1
Anson	--	1
Beaufort	--	1
Buncombe	Asheville	2
Cabarrus	--	1

State County	SMSA	Number of Mills
NORTH CAROLINA (cont.)		
Catawba	--	2
Durham	Durham	1
Edgecombe	--	1
Forsyth	Greensboro-Winston-Salem-High Point	1
Gaston	--	1
Guilford	Greensboro-Winston-Salem-High Point	2
Halifax	--	1
Harnett	--	3
Henderson	--	1
Hertford	--	1
Iredell	--	2
Johnston	--	2
Lee	--	2
Lenoir	--	3
Lincoln	--	1
Madison	--	1
Martin	--	1
Montgomery	--	1
Nash	--	1
Orange	--	1
Pasquotank	--	1
Rowan	--	2
Rutherford	--	1
Sampson	--	2
Scotland	--	1

State County	SMSA	Number of Mills
NORTH CAROLINA (cont.)		
Stokes	--	2
Union	Charlotte	2
Vance	--	2
Wake	Raleigh	2
Warren	--	1
Wayne	--	1
Wilkes	--	1
Wilson	--	1
NORTH DAKOTA		
Barnes	--	1
Grand Forks	--	2
Ward	--	1
OHIO		
Ashland	--	2
Auglaize	--	1
Belmont	Wheeling	1
Cuyahoga	Cleveland	1
Hamilton	Cincinnati	2
Highland	--	1
Hocking	--	1
Lorain	Lorain-Elyria	1
Lucas	Toledo	1
Mahoning	Youngstown-Warren	1
Marion	--	1
Mercer	--	1

State County	SMSA	Number of Mills
OHIO (cont.)		
Montgomery	Dayton	1
Muskingum	--	1
Portage	Akron	1
Ross	--	1
Seneca	--	1
Tuscarawas	--	1
Warren	Cincinnati	1
Wayne	--	1
OKLAHOMA		
Adair	--	1
Blaine	--	1
Canadian	Oklahoma City	3
Garfield	--	1
Kay	--	1
Logan	--	1
Oklahoma	Oklahoma City	1
Pottawatomie	--	1
OREGON		
Multnomah	Portland	3
Umatilla	--	1
Wasco	--	1
PENNSYLVANIA		
Adams	York	2
Berks	Reading	2
Blair	Altoona	1

State County	SMSA	Number of Mills
PENNSYLVANIA (cont.)		
Bucks	Philadelphia	1
Centre	--	1
Clinton	--	1
Columbia	--	3
Cumberland	Harrisburg	3
Dauphin	Harrisburg	2
Franklin	--	1
Huntingdon	--	1
Jefferson	--	1
Lancaster	Lancaster	9
Lebanon	--	2
Luzerne	Wilkes-Barre-Hazleton	1
Montgomery	Philadelphia	1
Northampton	Allentown-Bethlehem-Easton	1
Northumberland	--	2
Perry	Harrisburg	1
Philadelphia	Philadelphia	2
Union	--	1
York	York	5
RHODE ISLAND		
Providence	--	2
Washington	--	1
SOUTH CAROLINA		
Anderson	--	3
Berkeley	Charleston	1

State County	SMSA	Number of Mills
SOUTH CAROLINA (cont.)		
Cherokee	--	1
Clarendon	--	1
Edgefield	--	1
Florence	--	2
Greenwood	--	1
Lee	--	1
McCormick	--	1
Oconee	--	1
Pickens	Greenville	1
Richland	Columbia	1
Spartanburg	--	1
SOUTH DAKOTA		
Pennington	--	1
TENNESSEE		
Blount	Knoxville	4
Bradley	--	1
Cannon	--	1
Davidson	Nashville	2
Franklin	--	2
Greene	--	1
Hamilton	Chattanooga	2
Hawkins	--	2
Jefferson	--	2
Knox	Knox	1
Lauderdale	--	1

State County	SMSA	Number of Mills
TENNESSEE (cont.)		
Lawrence	--	1
Lincoln	--	1
McMinn	--	1
Marion	--	1
Maury	--	2
Monroe	--	1
Montgomery	--	1
Putnam	--	1
Robertson	--	2
Sevier	--	2
Shelby	Memphis	2
Sullivan	--	1
Warren	--	1
Washington	--	2
Weakley	--	1
TEXAS		
Bexar	San Antonio	2
Brown	--	1
Cameron	Brownsville-Harlingen-San Benito	1
Comal	--	1
Cooke	--	1
Dallas	Dallas	2
Deaf Smith	--	1
Denton	--	1
Frio	--	1

State County	SMSA	Number of Mills
TEXAS (cont.)		
Grayson	--	2
Guadalupe	San Antonio	1
Harris	Houston	1
Hemphill	--	1
Hidalgo	--	1
Howard	--	1
Hunt	--	1
Nueces	Corpus Christi	1
Potter	Amarillo	1
Tarrant	Fort Worth	2
Wichita	Wichita Falls	1
Young	--	1
UTAH		
Box Elder	--	1
Cache	--	2
Juab	--	1
Salt Lake	Salt Lake City	1
San Juan	--	1
Sanpete	--	1
Utah	Provo-Orem	2
Weber	Ogden	5
VIRGINIA		
Amelia	--	1
Arlington	Washington	1
Augusta	--	4

State County	SMSA	Number of Mills
VIRGINIA (cont.)		
Campbell	Lynchburg	2
Charlotte	--	1
Clarke	--	1
Dinwiddie	--	1
Franklin	--	2
Frederick	--	1
Halifax	--	1
Isle of Wight	--	1
Louisa	--	1
Lunenburg	--	1
Madison	--	1
Montgomery	--	1
Orange	--	1
Page	--	1
Pittsylvania	--	2
Roanoke	Roanoke	1
Rockbridge	--	1
Southampton	--	1
Spotsylvania	--	1
WASHINGTON		
King	Seattle-Everett	3
Pierce	Tacoma	1
Spokane	Spokane	5
WEST VIRGINIA		
Cabell	Huntington	1

State County	SMSA	Number of Mills
WEST VIRGINIA (cont.)		
Hardy	--	1
Morgan	--	1
Preston	--	1
WISCONSIN		
Dodge	--	1
Douglas	Duluth-Superior	1
Jefferson	--	1
Kewaunee	--	1
Milwaukee	--	1
Washington	--	1
Waupaca	--	2
WYOMING		
Johnson	--	1
Sheridan	--	1
Weston	--	1

F.9 Iron Foundries

Most foundry emissions emanate from the metal-melting operation. The cupola furnace is currently the most widely encountered melter in the iron foundry industry. Coke burning, in direct contact with the metal charge, supplies the heat for melting. The electric induction melting furnace, which is not used as often and which does not require fuel, is a much cleaner operation and is commonly used in making special alloys.

There were 1,681 iron foundries in the United States in 1968(21) (see table F-12). Since many of these are operated in conjunction with steelmaking facilities, they are located predominantly in the "steel" States; Pennsylvania has 185 foundries; Ohio, 165; Michigan, 123; Illinois, 109; and Alabama, 59. However, foundries are situated in all States except Alaska and Wyoming. Geographic distribution of iron foundries is depicted in figure F-9. Foundries are in large cities and small towns with 62 percent within SMSA's. Plant sizes range from small job cupolas operated several hours a day to large units (many tons per hour capacity) operated continuously for several successive days.

The principal gaseous contaminant issuing from cupolas is carbon monoxide. The carbon monoxide is sometimes burned to carbon dioxide, which results in the reduction of the carbon monoxide content and some combustible particulate emissions.

Particulates arise from fines in the coke and flux charged, from metal fuming, and from dirt and grease introduced with the scrap. A typical size distribution yields 4-10 percent of particles up to 5 microns;

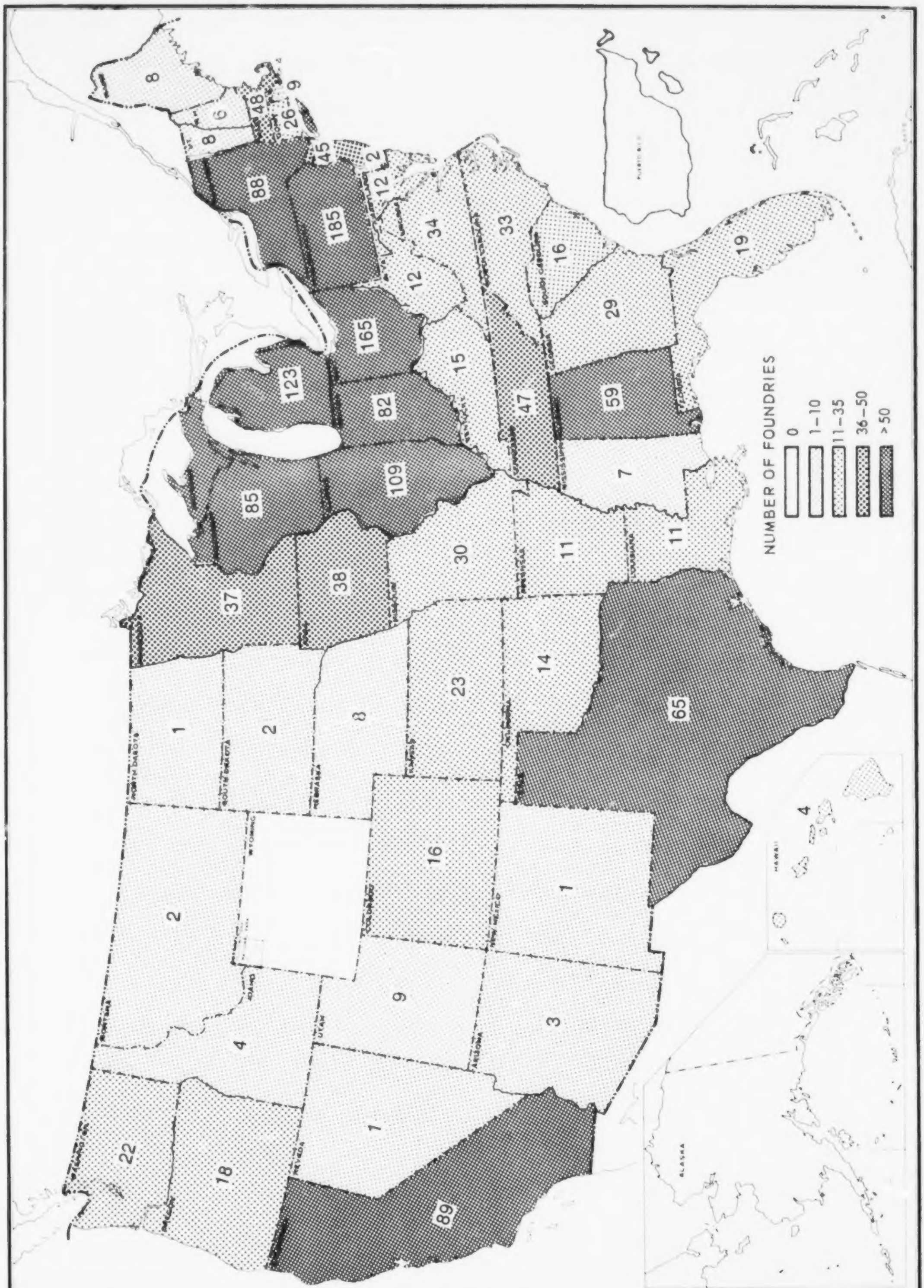
NUMBER OF FOUNDRIES
0
1–10
11–35
36–50
>50
22
18
1
89
2
4
9
3
16
1
1
2
8
23
14
65
37
38
30
11
11
85
109
123
82
165
47
15
59
7
12
34
33
16
29
19
185
88
45
12
2
8
6
48
26
9
8
4

Figure F-9. Iron foundries, 1968.

45-85 percent, 50 microns or more; and various percentages of intermediate size particles.(22)

Effective means of control are fabric filters, high energy scrubbers, and to a decreasing extent, electrostatic precipitators. For efficient control of the very fine particulates from cupola gases, it is necessary to maintain constant gas flow conditions to the control equipment since deviations of temperature and flow rate can adversely affect efficiency and equipment life. Similar equipment is used for control of emissions from electric arc melting furnaces; adequate fume control through hooding arrangements at the furnace is difficult to achieve during charging operations because of the required overhead equipment.

Table F-12. GRAY AND DUCTILE IRON FOUNDRIES
1968

State City	SMSA	Company
ALABAMA		
Alexander City	--	Russell Pipe & Foundry Co., Inc.
Alexander City	--	Robinson Foundry, Inc.
Alexander City	--	Kirkland-Weathers Foundry Co., Inc.
Anniston	--	Woodward Iron Co.
Anniston	--	U.S. Pipe & Foundry Co.
Anniston	--	Smith Foundry Co.
Anniston	--	M and H Valve and Fittings Co.
Anniston	--	Woodward Iron Co.
Anniston	--	Woodward Iron Co.
Anniston	--	Woodward Iron Co.
Anniston	--	S/Eastern Spec. & Mfg. Co., Inc.
Attalla	Gadsden	Unexcelled Mfg. Corp.
Bessemer	Birmingham	U.S. Pipe & Foundry Co.
Bessemer	Birmingham	Jones Foundry
Birmingham	Birmingham	Thomas Foundries, Inc.
Birmingham	Birmingham	Birmingham Stove & Range Co.
Birmingham	Birmingham	American Cast Iron Pipe Co.
Birmingham	Birmingham	Stockham Valves & Fittings, Inc.
Birmingham	Birmingham	McWane Cast Iron Pipe Co.
Birmingham	Birmingham	U.S. Pipe & Foundry
Birmingham	Birmingham	Fairmont Foundry Co.
Birmingham	Birmingham	Avondale Stove & Foundry Co., Inc.
Birmingham	Birmingham	Crane Foundry Co.

State City	SMSA	Company
ALABAMA (cont.)		
Birmingham	Birmingham	Cosper Foundry Mfg. Co., Inc.
Birmingham	Birmingham	Glidewell Specialties Foundry Co.
Birmingham	Birmingham	Lawler Mach. & Foundry Co., Inc.
Birmingham	Birmingham	Barry Pattern & Foundry Co.
Birmingham	Birmingham	Miller Foundry Co.
Birmingham	Birmingham	Jefferson Foundry Co.
Birmingham	Birmingham	James B. Clow and Sons, Inc.
Birmingham	Birmingham	Goslin Birmingham Mfg. Co., Inc.
Birmingham	Birmingham	Dimick Casting Co.
Brewton	--	Brewton Iron Works
Bridgeport	--	Jacobs Mfg. Co.
Calera	Birmingham	Southern Foundry
Columbiana	Birmingham	Simsco, Inc.
Fairfield	Birmingham	U.S. Steel Corp.
Florence	--	Martin Stove and Range Co.
Gadsden	Gadsden	Republic Steel Corp.
Gadsden	Gadsden	Woodward Iron Co.
Helena	Birmingham	Stubbs Foundry Co.
Holt	Tuscaloosa	Central Foundry Co.
Huntsville	Huntsville	Redstone Arsenal
Huntsville	Huntsville	John Blue Co.
Irondale	Birmingham	McQueen Foundry and Supply Co.
Mobile	Mobile	Gulf Foundry & Machine Co., Inc.
Mobile	Mobile	Mobile Pulley & Machine Works
Montgomery	Montgomery	Bama Foundries

State City	SMSA	Company
ALABAMA (cont.)		
Opelika	--	Opelika Foundry Co., Inc.
Opelika	--	Farmville Mfg. Co.
Phenix City	Columbus	Phenix Foundry
Prattville	--	Continental Moss-Gordin, Inc.
Selma	--	Southland Mower Co., Inc.
Sheffield	--	King Stove & Range Co.
Steele	--	United Foundries Corp.
Talladega	--	Talladega Foundry and Mach. Co.
Talladega	--	Newbury Mfg. Co.
Talledga	--	Brooks Foundry and Mach. Co., Inc.
Tuscaloosa	Tuscaloosa	Strickland Bros. Machine Co.
ARIZONA		
Phoenix	Phoenix	Midland-Ross Co.
Phoenix	Phoenix	Mallin Bros. Foundry
Tucson	Tucson	Tucson Iron Works
ARKANSAS		
Bentonville	--	Bentonville Casting Co.
Clarksville	--	Central Foundry & Stove Works
Ft. Smith	Ft. Smith	Didion & Sons Foundry
Ft. Smith	Ft. Smith	Boal Foundry & Machine Co., Inc.
Hope	--	Cox Bros. Foundry & Mach. Co., Inc.
Hope	--	Arkansas Machine Specialty Co.
Little Rock	Little Rock-North Little Rock	G.C. Evans Sales Co.
Mabelvale	Little Rock-North Little Rock	Midwest Casting Corp.
Pine Bluff	Pine Bluff	Electrical Equipment & Foundry Co.

State City	SMSA	Company
ARKANSAS (cont.)		
Smackover	--	So. Arkansas Foundry & Mach. Co.
West Memphis	Memphis	Mid-South Foundry Co.
CALIFORNIA		
Alameda	San Francisco-Oakland	U.S. Naval Air Station Overhaul & Rep.
Alhambra	Los Angeles-Long Beach	Gregg Iron Foundry Co.
Alhambra	Los Angeles-Long Beach	Alhambra Foundry Co., Ltd.
Anaheim	Anaheim-Santa Ana-Garden Grove	Anaheim Foundry Co.
Angels Camp	--	California Electric Steel Co.
Azusa	Los Angeles-Long Beach	Hoefer Foundry
Azusa	Los Angeles-Long Beach	Electric Casting Co., Inc.
Bakersfield	Bakersfield	Pacific Southern Foundries, Inc.
Bakersfield	Bakersfield	Bakersfield Foundry
Berkeley	San Francisco-Oakland	H.C. Macaulay Foundry Company
Brea	Anaheim-Santa Ana-Garden Grove	Mueller Co.
Compton	Los Angeles-Long Beach	Compton Foundry
Corona	San Bernardino-Riverside-Ontario	Rich Manufacturing Co.
El Monte	Los Angeles-Long Beach	Graning Co.
El Monte	Los Angeles-Long Beach	Gregg Iron Foundry
Elsinore	San Bernardino-Riverside-Ontario	Pac Castings-Elsinore
Eureka	--	Eureka Boiler Works & Acme Foundry Co.
Exeter	--	Waterman Co., Inc.
Fontana	San Bernardino-Riverside-Ontario	Kaiser Steel Corp.
Fullerton	Anaheim-Santa Ana-Garden Grove	Kohlenberger Eng. Corp.
Huntington Park	Los Angeles-Long Beach	Acme Castings, Inc.
Huntington Park	Los Angeles-Long Beach	Covert Iron Works

State City	SMSA	Company
CALIFORNIA (cont.)		
Huntington Park	Los Angeles-Long Beach	Ace Foundry Ltd.
La Puente	Los Angeles-Long Beach	Layne & Bowler Pump Co.
Lodi	Stockton	Lodi Iron Works, Inc.
Lodi	Stockton	Super Mold Corp. of California
Lodi	Stockton	Pinkerton Foundry, Inc.
Long Beach	Los Angeles-Long Beach	Frank Pattern Shop
Long Beach	Los Angeles-Long Beach	Centrifugal Prod., Inc.
Long Beach	Los Angeles-Long Beach	Long Beach Iron Works
Los Angeles	Los Angeles-Long Beach	Pacific Castings Co.
Los Angeles	Los Angeles-Long Beach	Commercial Enameling Co.
Los Angeles	Los Angeles-Long Beach	Commercial Iron Works
Los Angeles	Los Angeles-Long Beach	Globe Iron Foundry, Inc.
Los Angeles	Los Angeles-Long Beach	Industries Corp.
Los Angeles	Los Angeles-Long Beach	American Foundry
Los Angeles	Los Angeles-Long Beach	Quality Foundry, Inc.
Los Angeles	Los Angeles-Long Beach	Renfrow Foundry
Los Angeles	Los Angeles-Long Beach	Rich Manufacturing Co.
Los Angeles	Los Angeles-Long Beach	Modern Pattern & Foundry Co., Inc.
Los Angeles	Los Angeles-Long Beach	FMC Corp.
Los Angeles	Los Angeles-Long Beach	Fraters Valve & Fitting
Los Angeles	Los Angeles-Long Beach	Lincoln Foundry Corp.
Los Angeles	Los Angeles-Long Beach	Reliable Iron Foundry, Inc.
Newport Beach	Anaheim-Santa Ana-Garden Grove	Soundcast Co.
Oakland	San Francisco-Oakland	Vulcan Foundry Co.
Oakland	San Francisco-Oakland	Phoenix Iron Works Co.

State City	SMSA	Company
CALIFORNIA (cont.)		
Oakland	San Francisco-Oakland	Empire Foundry Co., Inc.
Oakland	San Francisco-Oakland	H. M. Nystrom Co.
Oakland	San Francisco-Oakland	Am. Brass and Iron Foundry
Oxnard	Oxnard-Ventura	Allis-Chalmers Mfg. Co.
Paramount	Los Angeles-Long Beach	Southwest Foundries
Paramount	Los Angeles-Long Beach	J and B Foundry
Pasadena	Los Angeles-Long Beach	Hoppings Foundry
Petaluma	--	Petaluma Iron & Alum. Foundry
Pomona	Los Angeles-Long Beach	Pomona Foundry, Inc.
Pomona	Los Angeles-Long Beach	Abex Corp.
Redding	--	Gerlinger Foundry & Machine Works, Inc.
Richmond	San Francisco-Oakland	Amradiator & Strd. Sanitary Corp.
Richmond	San Francisco-Oakland	Micro Metals, Inc.
Richmond	San Francisco-Oakland	Atlas Foundry and Mfg. Co.
Riverside	San Bernardino-Riverside-Ontario	Riverside Foundry
Sacramento	Sacramento	City Foundry
Sacramento	Sacramento	Aerojet-General Corp.
San Diego	San Diego	National Steel & Shipbuilding Co.
San Francisco	San Francisco-Oakland	San Francisco Iron Foundry
San Francisco	San Francisco-Oakland	Ajax Foundry Co.
San Francisco	San Francisco-Oakland	Bartlett-Snow-Pac, Inc.
San Jose	San Jose	San Jose Foundry
San Jose	San Jose	Johnson Iron Works
San Leandro	San Francisco-Oakland	Ridge Foundry
Santa Ana	Anaheim-Santa Ana-Garden Grove	E. B. Moritz Foundry

State City	SMSA	Company
CALIFORNIA (cont.)		
Santa Barbara	Santa Barbara	Westwick Iron Works
Santa Clara	San Jose	Western Castings Co.
Santa Fe Springs	Los Angeles-Long Beach	Alto Foundry and Mfg. Co., Inc.
Santa Fe Springs	Los Angeles-Long Beach	Allied Castings Co.
Santa Monica	Los Angeles-Long Beach	Ferro Castings Co.
South Gate	Los Angeles-Long Beach	Universal Cast Iron Mfg. Co.
South Gate	Los Angeles-Long Beach	Pacific Ball Mfg. Co.
South Gate	Los Angeles-Long Beach	Overton Foundry
South Gate	Los Angeles-Long Beach	Woodward Iron Co.
South Gate	Los Angeles-Long Beach	Bell Foundry Co.
South Gate	Los Angeles-Long Beach	Dayton Foundry
S. San Francisco	San Francisco-Oakland	Bay City Iron Foundry
Stockton	Stockton	K. P. F. Electric Co.
Stockton	Stockton	Super Mold Corp. of California
Sutter Creek	--	Knight Co.
Union City	San Francisco-Oakland	U.S. Pipe and Foundry Co.
Vallejo	Vallejo-Napa	U.S. Naval Shipyard Foundry
COLORADO		
Broomfield	Denver	Timberline Steel Co.
Canon City	--	Canon City Foundry & Mach. Co.
Colorado Springs	Colorado Springs	Denver Equipment Co.
Commerce City	Denver	Comco Foundry, Inc.
Denver	Denver	Western Foundries
Denver	Denver	Abex Corp.
Denver	Denver	United Iron Foundry

State City	SMSA	Company
COLORADO (cont.)		
Denver	Denver	Abex Corp.
Denver	Denver	C. S. Card Iron Works
Englewood	Denver	J. W. Reffel Metal Foundry, Inc.
Englewood	Denver	General Iron Works Co.
Grand Junction	--	Bolen Mach. Works & Foundry
Littleton	Denver	Electron Corp. Foundry
Longmont	Denver	Slack Horner Brass Mfg. Co.
Pueblo	Pueblo	Fountain Foundry
Pueblo	Pueblo	Colorado Fuel & Iron Corp.
CONNECTICUT		
Ansonia	--	Farrel Corporation
Branford	--	Malleable Iron Fittings Co.
Branford	--	Nutmeg Steel Castings Corp.
Bridgeport	Bridgeport-Stamford-Norwalk	Bullard Co.
Bridgeport	Bridgeport-Stamford-Norwalk	Producto Machine Co.
Bridgeport	Bridgeport-Stamford-Norwalk	Pequonnock Foundry, Inc.
Bridgeport	Bridgeport-Stamford-Norwalk	Acme Shear Co.
East Hampton	--	Bevin Bros. Mfg. Co.
Guilford	New Haven	I. S. Spencers Sons, Inc.
Hartford	Hartford	Laragy Foundry, Inc.
Hartford	Hartford	Philbrick-Booth & Spencer, Inc.
Meriden	Meriden	Meriden Foundry Co.
Middleton	--	North & Judd Co.
New Britain	Hartford-New Britain	Union Mfg. Co.
Noank	--	Noank Foundry Co., Inc.

State City	SMSA	Company
CONNECTICUT (cont.)		
Norwalk	Bridgeport-Stamford-Norwalk	Norwalk Iron Foundry, Inc.
Plainville	Hartford-New Britain	Plainville Casting Co.
Putnam	--	Leland Gifford Co.
Rocky Hill	--	Connecticut Foundry Co.
South Norwalk	Bridgeport-Stamford-Norwalk	Superior Castings Corp.
Southington	--	Southington Foundry Co., Inc.
Southington	--	Peck-Stow & Wilcox Co.
Stratford	Bridgeport-Stamford-Norwalk	Ductile Iron Foundry, Inc.
Torrington	--	Turner & Seymour Mfg. Co.
Waterbury	Waterbury	Waterbury Foundry Co.
Windsor	Hartford-New Britain	Taylor & Fenn Co.
DELAWARE		
New Castle	Wilmington	Abex Corp.
Wilmington	Wilmington	A. C. Layman Machine Co.
FLORIDA		
Archer	--	Maddox Foundry & Mach. Works, Inc.
Clearwater	Tampa-St. Petersburg	Gulf Machinery Co.
Daytona Beach	--	Clayton Foundry & Siren Co.
Gainesville	--	Gainesville Foundry & Mach. Works
Haines City	--	Florida Pipe and Foundry Co.
Jacksonville	Jacksonville	Florida Machine & Foundry Co.
Jacksonville	Jacksonville	American Collair Corp.
Jacksonville	Jacksonville	C. I. Capps Co., Inc.
Jacksonville	Jacksonville	Earl E. Ware Mfg. Co.
Lakeland	--	FMC Corp.

State City	SMSA	Company
FLORIDA (cont.)		
Miami	Miami	Florida Foundry & Pattern Work
Miami	Miami	Aircraft Casting, Inc.
Miami	Miami	U.S. Foundry and Mfg. Corp.
Opa-Locka	Miami	C. H. Lyne Foundry & Mach. Co., Inc.
Orlando	Orlando	Moore Foundry & Machine Shop
St. Petersburg	Tampa-St. Petersburg	Sunshine Foundry and Mach. Co.
Tallahassee	Tallahassee	Jackson Iron & Brass Foundry
Tallahassee	Tallahassee	R. O. Collins Iron Works
Tampa	Tampa-St. Petersburg	Dixie Foundry & Machine Co.
GEORGIA		
Americus	--	Dixon Foundry and Mach. Works
Athens	--	Athens Boiler and Mach. Works, Inc.
Atlanta	Atlanta	King Plow Co.
Atlanta	Atlanta	Grinnell Corp.
Atlanta	Atlanta	Higgins Foundry and Mach. Works
Atlanta	Atlanta	Cox Foundry and Machine Co.
Atlanta	Atlanta	Bolton-Emerson Southern, Inc.
Augusta	Augusta	Augusta Foundry, Inc.
Catersville	--	Cartersville Casting Co.
Cedartown	--	Cedartown Foundry and Mach. Co.
Columbus	Columbus	Pekor Iron Works, Inc.
Columbus	Columbus	Columbus Iron Works Co.
Columbus	Columbus	Goldens Foundry & Machine Co.
Gainesville	--	Gainesville Iron Works, Inc.
Grovetown	--	Georgia Iron Works Co.

State City	SMSA	Company
GEORGIA (cont.)		
Hampton	--	Southern States, Inc.
La Grange	--	La Grange Iron Works, Inc.
Macon	Macon	Taylor Iron Works & Supply Co.
Monroe	--	Monroe Foundry
Moultrie	--	Smith Bros. Foundry
Rome	--	Griffin Foundry and Machine Co.
Rome	--	Brewer & Taylor Foundry Co., Inc.
Rome	--	Dance Foundry
Rome	--	Fairbanks Co.
Savannah	Savannah	Savannah Machine & Foundry Co.
Savannah	Savannah	H & M Foundry, Inc.
Vienna	--	Vienna Foundry
Waycross	--	Dell Industries
West Point	--	Batson Cook Co.
HAWAII		
Honolulu	Honolulu	Honolulu Iron Works Co.
Honolulu	Honolulu	Novelty Foundry Co.
Honolulu	Honolulu	Yamamoto Foundry Works
Pearl Harbor	Honolulu	U.S. Navy Foundry & Pattern Shop
IDAHO		
Boise	Boise City	Baxter Foundry & Mach. Works, Inc.
Idaho Falls	--	Idaho Falls Foundry
Shelley	--	Belville Mfg. Co.
Weiser	--	Weiser Iron Works, Inc.

State City	SMSA	Company
ILLINOIS		
Alton	St. Louis	Gibraltar Equipment & Mfg. Co.
Alton	St. Louis	Duncan Foundry & Mach. Works, Inc.
Alton	St. Louis	Owens Illinois, Inc.
Amsted	Chicago	Amsted Research Labs.
Amsted	Chicago	James B. Clow and Sons, Inc.
Augusta	--	Augusta Foundry, Inc.
Aurora	Chicago	Fox Valley Foundry Co.
Batavia	Chicago	Lindgren Foundry Co.
Batavia	Chicago	C. W. Shumway & Sons
Belleville	St. Louis	Richland Foundry Co.
Belleville	St. Louis	Excelsior Foundry Co.
Belleville	St. Louis	Enterprise Foundry, Inc.
Belvidere	Rockford	Moline Malleable Iron Co.
Charleston	--	Midstate Foundry Co.
Chicago	Chicago	Link Belt Co.
Chicago	Chicago	International Harvester Co., Mfg. Research
Chicago	Chicago	Milles Equipment & Supply Co.
Chicago	Chicago	Mid-City Foundry Corp.
Chicago	Chicago	Sarcol, Inc.
Chicago	Chicago	Griffin Wheel Co.
Chicago	Chicago	Francis & Nygren Foundry Co.
Chicago	Chicago	Sheffield Foundry Co.
Chicago	Chicago	Ferguson & Lange Foundries, Inc.
Chicago	Chicago	ITT Research Institute
Chicago	Chicago	U.S. Steel Corp.

State City	SMSA	Company
ILLINOIS (cont.)		
Chicago	Chicago	Valley Mould & Iron Corp.
Chicago	Chicago	Abex Corp.
Chicago	Chicago	Litton Inc.
Chicago	Chicago	Crane Company
Chicago	Chicago	Elizabeth St. Foundry
Chicago	Chicago	Chicago Foundry Co.
Chicago	Chicago	T. L. Arzt Foundry Co.
Chicago	Chicago	Chicago Malleable Castings
Chicago	Chicago	Howard Foundry Co.
Chicago	Chicago	Greenlee Foundry Co.
Chicago Heights	Chicago	Chicago Heights Gray Iron Foundry
Chicago Heights	Chicago	Johnston and Jennings Foundry Corp.
Chicago Heights	Chicago	Abex Corp.
Danville	--	General Motor Co.
Decatur	Decatur	Union Iron Works
Decatur	Decatur	Wagner Casting Co.
Decatur	Decatur	Chambers-Bering-Quinlan Co.
Decatur	Decatur	Mueller Co.
Decatur	Decatur	Decatur Foundry, Inc.
DeKalb	--	Newquist Foundry Co.
East Alton	St. Louis	Buckler Foundry Co., Inc.
East Dubuque	--	Chicago Dubuque Foundry Corp.
East St. Louis	St. Louis	East St. Louis Castings Company
Elgin	Chicago	Woodruff & Edwards, Inc.
Franklin Park	Chicago	Illinois Precise Castings Co.

State City	SMSA	Company
ILLINOIS (cont.)		
Franklin Park	Chicago	Major Foundry Co., Inc.
Galena	--	Westwick Foundry, Inc.
Galena	--	Leadmine Foundry
Galva	Davenport-Rock Island-Moline	Galva Foundry Co.
Geneva	Chicago	Diversey Foundry Co.
Granite City	St. Louis	Granite City Steel Co.
Harrisburg	--	Egyptian Castings Co.
Havana	--	Atwood Vacuum Machine Co.
Hoopeston	--	F M C Corp.
Jacksonville	--	Leake Foundry & Machine Co.
Joliet	Chicago	Joliet Foundry
Kankakee	--	Kankakee Foundry Co.
Kewanee	--	Walworth Co., Kewanee Works
Lansing	Chicago	Vulcan Mold & Iron Co.
Lincoln	--	Lincoln Foundry
Mapleton	Peoria	Caterpillar Tractor Co.
Marengo	Chicago	Marengo Foundry Corp.
Martinsville	--	E. Rowe Foundry & Mach. Co.
Mascoutah	St. Louis	Modern Foundry & Mfg. Co.
Mattoon	--	H. W. Clark Co.
Minooka	--	Triangle Foundry Co., Inc.
Moline	Davenport-Rock Island-Moline	Deere & Company
Moline	Davenport-Rock Island-Moline	Fairbanks Morse Weighing
Moline	Davenport-Rock Island-Moline	Deere & Company
Moline	Davenport-Rock Island-Moline	Deere & Company

State City	SMSA	Company
ILLINOIS (cont.)		
Moline	Davenport-Rock Island-Moline	Williams White & Co.
Moline	Davenport-Rock Island-Moline	Frank Foundries Corp.
Moline	Davenport-Rock Island-Moline	Deere & Company
Mt. Vernon	--	Vernois, Inc.
New Athens	St. Louis	Autocrat Corp.
North Aurora	Chicago	D. R. Sperry & Co.
North Chicago	Chicago	Chicago Hardware Foundry Co.
Oregon	--	Paragon Foundries Co.
Pekin	Peoria	Pekin Foundry & Mfg. Co.
Peoria	Peoria	South Side Foundry Co.
Peoria	Peoria	M. H. Detrick Company
Peoria	Peoria	Caterpillar Tractor Co.
Plano	--	Weir Machine & Foundry Co.
Plano	--	Sandwich Iron Foundry
Plano	--	Monarch Foundry Co.
Prophetstown	--	Houdaille Industries, Inc.
Quincy	--	Gardner-Denver Co.
Quincy	--	Firestone Tire & Rubber Co.
Richmond	Chicago	Richmond Foundry
Rock Falls	--	Sterling Alloy Casting Co.
Rock Island	Davenport-Rock Island-Moline	Rock Island Arsenal
Rock Island	Davenport-Rock Island-Moline	International Harvester Co.
Rockford	Rockford	Kelsey-Hayes Company
Rockford	Rockford	Greenlee Bros. & Co.
Rockford	Rockford	W. L. Davey Pulp Corp.

State City	SMSA	Company
ILLINOIS (cont.)		
Rockford	Rockford	Mattison Machine Works
Salem	--	American Foundry and Mfg. Co.
Silvis	Davenport-Rock Island-Moline	John Deere Foundry Div.
Skokie	Chicago	Wells Manufacturing Co.
South Beloit	Rockford	Beloit Foundry Co.
South Beloit	Rockford	Mork Foundries, Inc.
Springfield	Springfield	Illinois Foundry Co.
St. Anne	--	St. Anne Foundry Co.
Waukegan	Chicago	North Shore Foundry Co.
INDIANA		
Akron	--	Akron Foundry, Inc.
Anderson	Anderson	Lavelle Gray Iron Foundry Corp.
Anderson	Anderson	General Motors Corp.
Auburn	--	Auburn Foundry, Inc.
Aurora	Cincinnati	Stedman Foundry, Inc.
Bluffton	--	Sterling Casting Co.
Bourbon	South Bend	Bourbon Foundry Co.
Bremen	South Bend	Bremen Gray Iron Foundry, Inc.
Cambridge City	--	Bertsch & Co., Inc.
Columbia City	--	Columbia Engineering Co.
Columbus	--	Woodward Iron Co.
Connersville	--	McQuay Norris Mfg. Co.
Crown Point	Gary-Hammond-East Chicago	Mainhard Foundry Co., Inc.
Decatur	--	Decatur Casting Co.
East Chicago	Gary-Hammond-East Chicago	Youngstown Sheet & Tube Co.

State City	SMSA	Company
INDIANA (cont.)		
East Chicago	Gary-Hammond-East Chicago	Inland Steel Co. Ingot Mold Foundry
Elberfeld	Evansville	Pioneer Enterprises, Inc.
Elkhart	--	Amgage & Machine Co.
Elkhart	--	Grede Foundries, Inc.
Elkhart	--	Elkhart Foundry & Mach. Co., Inc.
Ft. Wayne	Ft. Wayne	Central Foundry Co., Inc.
Griffith	Gary-Hammond-East Chicago	Keen Foundry Co., Inc.
Hammond	Gary-Hammong-East Chicago	G & N Sheeters & Erectors, Inc.
Indianapolis	Indianapolis	Ertel Mfg. Corp.
Indianapolis	Indianapolis	Dean Bros. Pumps, Inc.
Indianapolis	Indianapolis	Hoosier Foundry, Inc.
Indianapolis	Indianapolis	Kinsley Foundry Co.
Indianapolis	Indianapolis	C & G Potts, Inc.
Indianapolis	Indianapolis	FMC Corp.
Indianapolis	Indianapolis	Inter-State Foundry Co., Inc.
Indianapolis	Indianapolis	International Harvester Co.
Indianapolis	Indianapolis	Chrysler Corp. Industry Foundry
Jeffersonville	Louisville	Gorsuch Foundry Co., Inc.
Jonesboro	--	Twin City Foundry
Kendallville	--	Newman Foundry Co., Inc.
Kendallville	--	Lane Foundry, Inc.
Kendallville	--	Flint & Walling Mfg. Co.
Kokomo	--	Kokomo Foundry Co.
La Porte	--	La Porte Foundry Co., Inc.
La Porte	--	Casting Ser. Corp. of Indiana

State City	SMSA	Company
INDIANA (cont.)		
Leesburg	--	Archer Foundry Co.
Marion	--	Pope Foundry & Mach. Co., Inc.
Marion	--	Westpoint Foundry, Inc.
Marion	--	Atlas Foundry Co.
Marion	--	Bahr Bros. Mfg. Co.
Michigan City	--	Weil-McLain Co., Inc.
Michigan City	--	Josam Mfg. Co.
Mishawaka	South Bend	Wheelabrator Corp.
Mishawaka	South Bend	Dodge Mfg. Corp.
Mt. Vernon	--	Staples Foundry
Muncie	Muncie	Indiana-MacKay Foundry Corp.
Muncie	Muncie	Frank Foundries Corp.
New Albany	Louisville	Stratton & Terstegge Co.
New Castle	--	Davis Foundry Corp.
New Castle	--	Dana Corp.
Noblesville	Cincinnati	Noblesville Casting Co.
North Manchester	--	M. H. Detrick Co.
Peru	--	Peru Foundry Co.
Plymouth	South Bend	Plymouth Foundry, Inc.
Princeton	--	Dewey Bros. of Indiana, Inc.
Princeton	--	American Casting Service, Inc.
Richmond	--	Swayne-Robinson & Co.
Richmond	--	Dana Corp.
Rochester	--	American Lawn Mower co.
Rushville	--	Dana Corp.

State City	SMSA	Company
INDIANA (cont.)		
South Bend	South Bend	South Bend Foundry Co.
South Bend	South Bend	Cummins Engine Co.
South Bend	South Bend	Sibley Mach. & Foundry Corp.
Terre Haute	Terre Haute	Gartland Foundry Co.
Terre Haute	Terre Haute	Knight Terre Haute Foundry
Terre Haute	Terre Haute	Frank Prox. Co., Inc.
Terre Haute	Terre Haute	Davies Foundry, Inc.
Tippecanoe	South Bend	Barth Foundry Div. Barth Corp.
Union City	--	Union City Mold & Die Cast Co.
Upland	--	Letukas Foundry
Veedersburg	--	Fountain Foundry Corp.
Vincennes	--	Murphy & Sons Foundry
Warsaw	--	Dalton Foundries, Inc.
Warsaw	--	Lakeside Foundry
Warsaw	--	Huffer Foundry Co., Inc.
Warsaw	--	Warsaw Foundry Co., Inc.
Winchester	--	Overmyer Mold Co.
IOWA		
Bloomfield	--	Bloomfield Foundry, Inc.
Boone	--	Quinn Wire & Iron Works
Cedar Falls	--	Viking Pump Co.
Cedar Falls	--	Viking Pump Co.
Cedar Rapids	--	Iowa Steel & Iron Works, Inc.
Centerville	--	Morse Foundry Co.
Charles City	--	Oliver Corp.

State City	SMSA	Company
IOWA (cont.)		
Clinton	--	Waukesha Motor Co.
Clinton	--	Iowa Machine Works & Foundry
Council Bluffs	Omaha	Kimball Brothers Co.
Council Bluffs	Omaha	Katelman Foundry & Mfg. Co.
Council Bluffs	Omaha	Amsted Industries, Inc.
Davenport	Davenport-Rock Island-Moline	Weil-McLain, Inc.
Davenport	Davenport-Rock Island-Moline	Middle States Corp.
Davenport	Davenport-Rock Island-Moline	Blackhawk Foundry & Machine Co.
Davenport	Davenport-Rock Island-Moline	Frank Foundries Corp.
Des Moines	Des Moines	C. J. Mossberc Foundry
Des Moines	Des Moines	Eagle Iron Works, Inc.
Dubuque	Dubuque	Deere & Co.
Durant	Davenport-Rock Island-Moline	Russelloy Foundry Co.
Fairfield	--	Philco-Ford Corp.
Keokuk	--	Kumo Foundry Co.
Maquoketa	--	Clinton Engines Corp.
Marshalltown	--	Marshalltown Foundry Co.
Marshalltown	--	Gra-Iron Foundry Corp.
Marshalltown	--	Bigelow-Liptak Corp.
Mason City	--	Mason City Foundry & Mfg. Co.
Newton	--	Newton Foundry
Oskaloosa	--	Iowa Valve Co.
Perry	--	Progressive Foundry, Inc.
Sioux City	Sioux City	Sioux City Foundry Co.
Stockton	--	Quality Foundry Co.

State City	SMSA	Company
IOWA (cont.)		
Waterloo	Waterloo	Deere & Co.
Waterloo	Waterloo	Hawkeye Steel Products
Waterloo	Waterloo	Construction Mach. Co.
Waterloo	Waterloo	Headford Bros. & Hitchins Foundry
Webster	--	Seneca Foundry, Inc.
West Burlington	--	S. S. S. Gray Iron Works Corp.
KANSAS		
Arkansas City	--	Beard Foundry and Mach. Works
Belleville	--	Ausherman Mfg. Co.
Coffeyville	--	Jensen Bros. Mfg. Co., Inc.
Coffeyville	--	Acme Foundry and Mach. Co.
Colby	--	Reed Mfg.
Dodge City	--	P. J. Bays Foundry
Enterprise	--	J. B. Ehrsam and Sons Mfg. Co.
Ft. Scott	--	Crescent Foundry
Garden City	--	Sooby Foundry
Hutchinson	--	Krause Corp.
Hutchinson	--	Hutchinson Foundry and Steel Co.
Hutchinson	--	M. W. Hartmann Mfg. Co., Inc.
Iola	--	Walton Foundry
Kansas City	Kansas City	Colt Industries, Inc.
Leavenworth	--	Kremer Mach. & Eng. Prods.
Pittsburg	--	McNally Pittsburg Mfg. Corp.
Salina	--	Wyatt Mfg. Co., Inc.
Wichita	Wichita	Western Iron and Foundry Co., Inc.

State City	SMSA	Company
KANSAS (cont.)		
Wichita	Wichita	Service Iron Foundry
Wichita	Wichita	Ferroloy Foundry, Inc.
Wichita	Wichita	Ehrsam Wichita Foundry, Inc.
Winfield	--	Winfield Foundry
Winfield	--	Sonner Burner
KENTUCKY		
Ashland	Huntington-Ashland	Armco Steel Corp.
Covington	Cincinnati	Star Foundry Co.
Covington	Cincinnati	Klaene Foundry Co., Inc.
Independence	Cincinnati	Independence Foundry
Louisville	Louisville	Vulcan-Hart Corp.
Louisville	Louisville	Dover Corp.
Louisville	Louisville	International Harvester Co.
Louisville	Louisville	Henry Vogt Machine Co.
Louisville	Louisville	Dover Corp.
Louisville	Louisville	Schmutz Foundry & Mach. Co.
Louisville	Louisville	Logan Co., Inc.
Louisville	Louisville	R. C. Tway Co.
Middlesboro	--	J. R. Hoe & Sons, Inc.
Murray	--	Tappan Co.
Owensboro	--	Amer. Casting Service, Inc.
LOUISIANA		
Alexandria	--	Ruston Foundry and Mach. Shops, Ltd.
Alexandria	--	Carbo Foundry and Mach. Shop
Baton Rouge	Baton Rouge	Istrouma Foundry and Mach. Works

State City	SMSA	Company
LOUISIANA (cont.)		
Bogalusa	--	Bogalusa Iron Works, Inc.
Clinton	--	Ruhr Castings Corp.
Denham Springs	--	Vulcan Foundry, Inc.
New Orleans	New Orleans	Avondale Shipyards, Inc.
Plaquemine	--	Nadler Foundry & Mach. Co., Inc.
Prairieville	--	Pearce Foundry, Inc.
Shreveport	Shreveport	Shreveport Brass Works
Thibodaux	--	West End Foundry
MAINE		
Auburn	Lewiston-Auburn	Androscoggin Foundry
Dexter	--	Fayscott Landis Corp.
Lewiston	Lewiston-Auburn	Enterprise Foundry, Inc.
Livermore	--	Record Foundry & Mach. Co.
Milford	--	W. H. Ward & Son
Millinocket	--	Millinocket Foundry & Mach. Co.
Portland	Portland	Portland Stove Foundry Co.
Portland	Portland	Etherridge Foundry & Mach. Co.
MARYLAND		
Baltimore	Baltimore	Flynn and Emrich Co.
Baltimore	Baltimore	Abex Corp.
Baltimore	Baltimore	Glamorgan Pipe and Foundry Co.
Baltimore	Baltimore	Am Radiator and Stard San Corp.
Baltimore	Baltimore	Koppers Co., Inc.
Baltimore	Baltimore	National Sash Weight Corp.
Baltimore	Baltimore	J. J. Lacy, Inc.

State City	SMSA	Company
MARYLAND (cont.)		
Frederick	--	Frederick Iron and Steel Co., Inc.
Hagerstown	--	Potomac Foundry Co.
Hagerstown	--	Kaufman Mfg. & Supply Co.
Luke	--	Piedmont Foundry & Mach. Co.
Sparrows Point	Baltimore	Bethlehem Steel Corp.
MASSACHUSETTS		
Amesbury	--	Reid Foundry Company
Athol	--	Highland Foundry
Barre	--	Chas. G. Allen Company
Beverly	Boston	United Shoe Machinery Corp.
Blackstone	Providence-Pawtucket-Warwick	Charlette Bros. Iron Foundry
Boston	Boston	Mechanics Iron Foundry Company
Boston	Boston	U.S. Navy
Bridgewater	Brockton	Henry Perkins Company
Bridgewater	Brockton	Bridgewater Foundry Co., Inc.
Brockton	Brockton	E. L. Lebaron Foundry Company
Charlton	--	Bathgate Foundry Co., Inc.
Chicopee	Springfield-Chicopee-Holyoke	Production Pattern & Foundry Co.
Danvers	Boston	Danvers Foundry & Mach. Co., Inc.
Easthampton	Springfield-Chicopee-Holyoke	Easthampton Foundry, Inc.
Everett	Boston	Shahmoon Industries, Inc.
Fitchburg	Fitchburg-Leominster	Fitchburg Foundry, Inc.
Franklin	Providence-Pawtucket-Warwick	Ferrum Foundry, Inc.
Gilbertville	--	Pioneer Foundry & Mfg. Co., Inc.
Graniteville	--	Graniteville Foundry Co.

State City	SMSA	Company
MASSACHUSETTS (cont.)		
Greenfield	--	Millers Falls Co.
Haverhill	Lawrence-Haverhill	Allan Machine & Foundry Co.
Holbrook	Boston	Holbrook Foundry
Holliston	--	Holliston Foundry Machine Co.
Holyoke	Springfield-Chicopee-Holyoke	Arrow Alloys, Inc.
Hopedale	--	Draper Corp.
Indian Orchard	Springfield-Chicopee-Holyoke	Plainville Casting Co.
Lawrence	--	Hamblet Machine Co.
Lowell	--	Lowell Foundry, Inc.
Lowell	--	Robinson Foundry Co.
Lynn	Boston	General Electric Co.
Lynn	Boston	Lynn Iron Foundry, Inc.
Millbury	Worcester	Millbury Foundry Co.
North Andover	--	Davis & Furber Machine Co.
North Attleboro	New Bedford	N. Attleboro Foundry Co., Inc.
North Quincy	Boston	Wollaston Foundry Corp.
Norwood	Boston	Bay State Iron Foundry
Orange	--	Rodney Hunt Co.
Orange	--	Independent Lock Co.
Rehoboth	New Bedford	G & W Foundry Co., Inc.
Somerset	New Bedford	Chorlton Foundry Co., Inc.
West Concord	--	Concord Foundries Div.
Whitman	Brockton	Whitman Foundry, Inc.
Winchendon	--	Alaska Freezer Co., Inc.
Worcester	Worcester	Fremont Casting Co., Inc.

State City	SMSA	Company
MASSACHUSETTS (cont.)		
Worcester	Worcester	Worcester Foundry Co., Inc.
Worcester	Worcester	Standard Foundry Co.
Worcester	Worcester	Rice Barton Corp.
Worcester	Worcester	Crompton & Knowles Corp.
MICHIGAN		
Adrian	--	Cast Metal Bars Corp.
Albion	--	Albion Malleable Iron Co.
Albion	--	Ideal Castings Co.
Albion	--	Gale Manufacturing Co.
Albion	--	Brooks Foundry, Inc.
Alpena	--	Besser Co.
Alpena	--	Thunder Bay Mfg. Corp.
Ann Arbor	Ann Arbor	Ann Arbor Foundry Co.
Battle Creek	--	Springfield Foundry
Battle Creek	--	Battle Creek Foundry Co.
Bay City	Bay City	Bay City Foundry Co.
Bridgman	--	Casting Service of Michigan
Brighton	--	Golden Manufacturing Co.
Cadillac	--	Cadillac Foundry Co., Inc.
Cadillac	--	Inland Lakes Foundry Co.
Calumet	--	Calumet & Hecla, Inc.
Cedar Springs	Grand Rapids	Engineering Foundry, Inc.
Charlotte	--	Johnson Iron Industries
Clio	Flint	Clio Foundry, Inc.
Coldwater	--	Marmon Group, Inc.

State City	SMSA	Company
MICHIGAN (cont.)		
Dearborn	Detroit	Ford Motor Co., Dearborn Spec Foundry
Dearborn	Detroit	Ford Motor Co., Ingot Mold Foundry
Dearborn	Detroit	Ford Motor Co.
Detroit	Detroit	Riley Stoker Corp.
Detroit	Detroit	Kahl Iron Foundry, Inc.
Detroit	Detroit	Grant Bos. Foundry Co.
Detroit	Detroit	Central Iron Foundry Co.
Detroit	Detroit	Stuart Foundry Co.
Detroit	Detroit	Kelsey-Hayes Co.
Detroit	Detroit	Conway Foundry Co.
Detroit	Detroit	Apex Foundry, Inc.
Detroit	Detroit	Budd Company
Detroit	Detroit	Process Foundry Co.
Detroit	Detroit	Acme Foundry Co.
Detroit	Detroit	Industrial Castings Co.
Detroit	Detroit	Martin Foundries
Detroit	Detroit	Atlas Foundry Co.
Detroit	Detroit	Chrysler Corp., Winfield Foundry
Detroit	Detroit	Chrysler Corp., Huber Ave. Foundry
Detroit	Detroit	Chrysler Corp., Hamtramck Foundry
Detroit	Detroit	Motor & Machinery Casting Co.
Detroit	Detroit	Ford Motor Co.
E. Jordan	--	East Jordan Iron Works, Inc.
Flint	Flint	General Motors Corp.
Flint	Flint	Pattern & Eng. Co. Genesee Foundry

State City	SMSA	Company
MICHIGAN (cont.)		
Flint	Flint	General Foundry & Mfg. Co.
Grand Rapids	Grand Rapids	Dover Corp.
Grand Rapids	Grand Rapids	Grand Rapids Foundry
Grand Rapids	Grand Rapids	Connor Foundry Co.
Grand Rapids	Grand Rapids	American Seating Co.
Grand Rapids	Grand Rapids	Kent Foundry Company
Grand Rapids	Grand Rapids	Gallmeyer & Livingstone Co., Foundry Dept.
Grand Rapids	Grand Rapids	Betz Foundry, Inc.
Hancock	--	Calumet & Hecla, Inc.
Hastings	--	Tyden Corp.
Hastings	--	E. W. Bliss Company
Hillsdale	--	Hillsdale Foundry Co., Inc.
Holland	--	Consolidated Foundry & Mfg.
Homer	--	Calhoun Foundry Co., Inc.
Howell	--	Michigan Metallurgical Prod.
Imlay City	Flint	Almont Mfg. Co.
Jackson	Jackson	Pioneer Foundry Co., Inc.
Kalamazoo	Kalamazoo	U.S. Foundry Corp.
Kalamazoo	Kalamazoo	Riverside Foundry & Galvanizing Co.
Kingsford	--	Grede Foundries, Inc., Iron Mt. Div.
Lansing	Lansing	Centrifuse, Inc.
Lapeer	Flint	Bostick Foundry Co.
Ludington	Muskegon-Muskegon Heights	Great Lakes Founders & Mach. Corp.
Manistee	--	Michigan Tool Co.
Marquette	--	Lake Shore, Inc.

State City	SMSA	Company
MICHIGAN (cont.)		
Marshall	--	Midwest Supply Co.
Marshall	--	Livingston, Inc.
Marshall	--	Engineering Castings, Inc.
Marysville	--	Midwest Mach. Co. of Indiana
Melvindale	Detroit	Delray Foundry Co.
Menominee	--	L. E. Jones Co., Inc.
Menominee	--	Giddings & Lewis Mach. Tool Co.
Midland	--	Midland Iron Works
Milan	Toledo	P K & A Foundry, Inc.
Milan	Toledo	Donovan Wire & Iron Co.
Montague	Muskegon-Muskegon Heights	White Lake Foundry Co.
Munising	--	Munising Foundry
Muskegon	Muskegon-Muskegon Heights	Campbell-Wyant & Cannon Foundry Div.
Muskegon	Muskegon-Muskegon Heights	Sealed Power Corp.
Muskegon	Muskegon-Muskegon Heights	Standard Automotive Parts Co.
Muskegon	Muskegon-Muskegon Heights	Lakey Foundry Corp.
Muskegon	Muskegon-Muskegon Heights	Sealed Power Corp.
Muskegon	Muskegon-Muskegon Heights	Campbell-Wyant & Cannon Foundry Div.
Muskegon	Muskegon-Muskegon Heights	Campbell-Wyant & Cannon Foundry Div.
Muskegon	Muskegon-Muskegon Heights	Campbell-Wyant & Cannon Foundry Div.
Muskegon	Muskegon-Muskegon Heights	Campbell-Wyant & Cannon Foundry Div.
New Haven	Detroit	New Haven Foundry, Inc.
Newaygo	--	Echlin Mfg. Co.
Owosso	--	Pat Bard Castings Co.
Pontiac	Detroit	General Motors Corp.

State City	SMSA	Company
MICHIGAN (cont.)		
Port Huron	--	Moak Machine & Foundry Co.
Port Huron	--	Little Foundries, Inc.
Ravenna	Muskegon-Muskegon Heights	Alloyed Grairon Castings Corp.
Ravenna	Muskegon-Muskegon Heights	Ravenna Products, Inc.
Richmond	Detroit	Allen Cooler & Ventilator, Inc.
Romulus	Detroit	New Iron Foundry Co.
Rothbury	--	Kurdziel Iron Industries, Inc.
Saginaw	Saginaw	Eaton Yale & Towne, Inc.
Saginaw	Saginaw	General Motors Corp.
Saginaw	Saginaw	Valley Grey Iron Foundry Co.
South Haven	--	Wilhelm Baum Machine Works
South Haven	--	National Motor Castings
St. Johns	Lansing	Advance Castings Co.
St. Joseph	--	Bendix Corp.
Stevensville	--	Anstey Foundry Company
Sturgis	--	Sturgis Foundry Corp.
Three Rivers	--	Dock Foundry Co.
Traverse City	--	Traverse City Iron Works
Trenton	Detroit	Vulcan Mold & Iron Co., Ingot. Mold Foundry
Vassar	--	Vassar Electroloy
Vassar	--	Eaton Yale & Towne, Inc.
Warren	Detroit	Duplicast Corp.
Warren	Detroit	Schwarb Foundry Co.
Warren	Detroit	GMC Tech. Center Research Labs.

State City	SMSA	Company
MICHIGAN (cont.)		
Wayne	Detroit	Enot Foundry Company
Wyandott	Detroit	Great Lakes Mfg. & Foundry Co.
Ypsilanti	Ann Arbor	Motor Wheel Corp.
Zeeland	Grand Rapids	Ferro-Cast Corp.
MINNESOTA		
Albert Lea	--	King Seeley Thermos Co.
Brainerd	--	Brainerd Foundry Co.
Chaska	--	Ess Bros. and Sons
Duluth	Duluth-Superior	Duluth Brass & Aluminum Co.
Duluth	Duluth-Superior	Western Iron Foundry Co.
Duluth	Duluth-Superior	Globe-Duluth Iron Works, Inc.
Fairmont	--	Fairmont Rwy Motors, Inc.
Faribault	--	Nutting Truck & Caster Co.
Lake City	--	Gould National Batteries, Inc.
Mankato	--	Dotson Co.
Minneapolis	Minneapolis-St. Paul	Minneapolis-Moline, Inc.
Minneapolis	Minneapolis-St. Paul	Acme Foundry Co.
Minneapolis	Minneapolis-St. Paul	Southside Foundry
Minneapolis	Minneapolis-St. Paul	Smith System Mfg. Co.
Minneapolis	Minneapolis-St. Paul	Scott-Atwater Foundry Co.
Minneapolis	Minneapolis-St. Paul	Mereen-Johnson Mach. Co.
Minneapolis	Minneapolis-St. Paul	Central Mach. Works Co.
Minneapolis	Minneapolis-St. Paul	Prospect Foundry, Inc.
Minneapolis	Minneapolis-St. Paul	National Foundry Co.
Minneapolis	Minneapolis-St. Paul	Marrin Foundry, Inc.

State City	SMSA	Company
MINNESOTA (cont.)		
Minneapolis	Minneapolis-St. Paul	Kausel Foundry Co.
Minneapolis	Minneapolis-St. Paul	Carter-Day Co.
Minneapolis	Minneapolis-St. Paul	Archer-Daniels-Midland Co.
Minneapolis	Minneapolis-St. Paul	Hunstad Foundry
Minneapolis	Minneapolis-St. Paul	Abex Corp.
Owatonna	--	N. Star Mach. Shop and Foundry, Inc.
Sartell	--	Dezurik Corp.
St. Cloud	--	Granite City Iron Works Co.
St. Paul	Minneapolis-St. Paul	Pier Foundry and Pattern Shop
Stillwater	Minneapolis-St. Paul	Minnesota Prison Inds.
Two Harbors	--	Abex Corp.
Virginia	Minneapolis-St. Paul	Staver Foundry Co.
Winona	--	Diamond Huller Co.
Winona	--	Brom Machine and Foundry Co.
Winona	--	Badger Foundry Co.
Winona	--	Standard Foundry Co.
Winona	--	Gorman Co.
MISSISSIPPI		
Biloxi	--	McElroy Machine Foundry & Mfg. Co.
Hattiesburg	--	C. L. Dews & Sons Foundry & Mach. Co., Inc.
Jackson	Jackson	Harper Foundry & Machine Co.
Jackson	Jackson	Mississippi Foundry & Machine Co.
Laurel	--	Laurel Machine & Foundry Co.
Meridian	--	Soule Steam Feed Works

State City	SMSA	Company
MISSISSIPPI (cont.)		
Oliver Branch	--	Cont. Foundry & Machine Works
MISSOURI		
Bonne Terre	--	Bonne Terre Foundry
Clinton	--	Alva Allen Industries
Crocker	--	Skaggs Manufacturing Co.
Independence	Kansas City	Independence Stove and Mfg. Co.
Jackson	--	McNeely Bros. Foundry & Machine Works
Joplin	--	Skil-Cast Casting & Machine Co.
Joplin	--	Missouri Rogers Corp.
Kansas City	Kansas City	Kansas City Hay Press Co.
Kansas City	Kansas City	Abex Corp. RR Products
Kansas City	Kansas City	Blue Valley Foundry Co.
Kansas City	Kansas City	Morgan Foundry Co.
Kansas City	Kansas City	Arpocalloy Co.
La Grange	--	Gardner-Denver co.
Ouenweg	--	Crouchs Foundry
Pleasant Hill	Kansas City	J. R. Prewitt and Sons, Inc.
Springfield	Springfield	A. J. Industries, Inc.
St. Joseph	St. Joseph	Mosher Aluminum Foundry
St. Joseph	St. Joseph	Degginger Foundry & Mfg. Co., Inc.
St. Louis	St. Louis	Spuck Iron and Foundry Co.
St. Louis	St. Louis	Progressive Pattern Co.
St. Louis	St. Louis	Carondelet Foundry Co.
St. Louis	St. Louis	McQuay-Norris Mfg. Co.
St. Louis	St. Louis	Laclede Stoker Co.

State City	SMSA	Company
MISSOURI (cont.)		
St. Louis	St. Louis	Century Foundry
St. Louis	St. Louis	Banner Iron Works
St. Louis	St. Louis	Liberty Foundry Co.
St. Louis	St. Louis	Semi-Steel Casting Co.
St. Louis	St. Louis	Didion and Sons Foundry, Inc.
St. Louis	St. Louis	Banner Iron Works
St. Louis	St. Louis	Abex Corp.
MONTANA		
Anaconda	--	Anaconda Co.
Helena	--	Caird Engineering Works
NEBRASKA		
Beatrice	--	Dempster Industries, Inc.
Columbus	--	Columbus Metal Casting, Inc.
Fremont	--	Fremont Foundry & Machine Co.
Gering	--	Sishc Mfg. Co.
Hastings	--	Western Land Roller Co.
Hastings	--	Spitz Foundry
Lincoln	Lincoln	Deeter Foundry, Inc.
Omaha	Omaha	Paxton-Mitchell Co.
NEVADA		
McGill	--	Kennecott Copper Corp.
NEW HAMPSHIRE		
Chester	--	New Hampshire Grey Iron, Inc.
Dover	--	Kidder Press Co., Inc.

State City	SMSA	Company
NEW HAMPSHIRE (cont.)		
Laconia	--	Frank W. Guyer
Milford	--	Hitchiner Mfg. Co., Inc.
Nashua	--	Nashua Foundries, Inc.
Nashua	--	Spaulding Metal Works, Inc.
NEW JERSEY		
Berlin	Philadelphia	Baccellieri Mfg. Co.
Boonton	Newark	National Sash Weight Corp.
Bridgeton	--	Jos Toye Co.
Bridgeton	--	Salem Pipe & Iron Mfg. Co.
Burlington	Philadelphia	U.S. Pipe & Foundry Co.
Camden	Philadelphia	Camden Foundry Co.
Camden	Philadelphia	Universal Rundle Corp.
Dunellen	--	R. Hoe & Co., Inc.
East Orange	Newark	U.S. Pipe & Foundry Co.
Elizabeth	Newark	Singer Co.
Flagtown	--	General Foundry Co.
Flanders	Newark	Richardson Corp.
Flemington	--	Foran Foundry & Mfg. Co.
Florence	Philadelphia	Amsted Industries, Inc.
Fords	--	Fords Foundry
Grenloch	Philadelphia	H. G. Enderlein Co., Inc.
Harrison	Jersey City	T. Shriver & Co., Inc.
Harrison	Jersey City	Worthington Corp.
Harrison	Jersey City	Campbell Foundry Co.
High Bridge	--	Taylor-Wharton Div.

State City	SMSA	Company
NEW JERSEY (cont.)		
Irvington	Newark	Am Abrasive Metals Co.
Irvington	Newark	Bierman-Everett Foundry Co., Inc.
Irvington	Newark	Barnett Foundry & Machine Co.
Little Falls	Paterson-Clifton-Passaic	North Jersey Foundry Co., Inc.
Lyndhurst	Paterson-Clifton-Passaic	Leslie Co.
Mahwah	Paterson-Clifton-Passaic	Abex Corp.
Millville	--	Ferro Pipe & Foundry Co.
Newark	Newark	Flockhart Foundry Co.
Newark	Newark	Standard Universal Products
Palmyra	Philadelphia	Palmyra Foundry Co., Inc.
Passaic	Paterson-Clifton-Passaic	Binns-Passaic Iron & Brass Foundry
Paterson	Paterson-Clifton-Passaic	Watson Machine Co.
Paterson	Paterson-Clifton-Passaic	Benjamin Eastwood Foundry & Machine Co.
Paterson	Paterson-Clifton-Passaic	Laytham Foundry, Inc.
Perth Amboy	--	International Smelting & Refining Co.
Phillipsburg	Allentown-Bethlehem-Easton	Ingersoll-Rand
Phillipsburg	Allentown-Bethlehem-Easton	Shahmoon Industries, Inc.
Plainfield	Newark	Wood Newspaper Machine Corp.
Plainfield	Newark	Gibraltar Mfg. Co., Inc.
Pynhurst	Atlantic City	Bur Barbell Co.
Riverton	Philadelphia	Grinding Balls, Inc.
Rosenhayn	--	Contractors Foundry, Inc.
Trenton	Trenton	E. J. Schudder Foundry & Machine Co.
Trenton	Trenton	Crossley Machine Co.
Williamstown	Philadelphia	Williamstown Foundry Corp.

State City	SMSA	Company
NEW MEXICO		
Albuquerque	Albuquerque	Albuquerque Foundry & Machine Works
NEW YORK		
Amsterdam	--	Mohasco Industries, Inc.
Athens	--	Wormuth Bros. Foundry
Attica	--	Westinghouse Electric Corp.
Auburn	--	Auburn Foundry Co.
Barker	Buffalo	McAdam & Sons
Batavia	--	Climax Corp.
Binghamton	Binghamton	Fairbanks Co.
Brooklyn	New York	Metropolitan Iron Foundry
Brooklyn	New York	Taylor & Co., Inc.
Brooklyn	New York	Standard Iron Foundry
Buffalo	Buffalo	Buffalo Forge Co.
Buffalo	Buffalo	Buffalo Pipe & Foundry Corp.
Buffalo	Buffalo	Shenango, Inc.
Buffalo	Buffalo	Worthington Corp.
Buffalo	Buffalo	Pohlman Foundry Co., Inc.
Buffalo	Buffalo	General Motors Corp.
Buffalo	Buffalo	Amherst Foundry, Inc.
Buffalo	Buffalo	Amherst Radiator & Standards San. Corp.
Buffalo	Buffalo	Abex Corp. RR Prod. Div.
Buffalo	Buffalo	Scott Castings Corp.
Champlain	--	Sherdian Co.
Coxsackie	--	Am Valve Mfg. Corp.
Dansville	Rochester	Foster Wheeler Corp.

State City	SMSA	Company
NEW YORK (cont.)		
Dunkirk	--	Dunkirk Radiator Corp.
Elmira	--	Kennedy Valve Mfg. Co., Inc.
Elmira	--	General Electric Co.
Elmira	--	Chemung Foundry Corp.
Floral Park, Long Island	New York	A Company
Friendship	--	Drake Mfg. Co., Inc.
Geneva	--	Geneva Foundry Corp.
Goshen	--	Newbury Pipe Fittings Co., Inc.
Gowanda	--	Gowanda Furnaces, Inc.
Greene	--	Greene Iron Foundry
Hillsdale	--	Hillsdale Iron & Alum. Foundry
Hudson Falls	--	L. K. Lapan & Sons Foundry
Hudson Falls	--	Sandy Hill Corp.
Jamestown	--	Blackstone Corp.
Jamestown	--	Jamestown Iron Works
Johnstown	--	Travis & Oczko, Inc.
Lackawanna	--	Bethlehem Steel Corp.
Lackawanna	--	Lackawanna Foundry Co.
Lakeville	Rochester	Progressive Foundries
Liberty	--	Liberty Iron Foundry
Lockport	Buffalo	Dussault Foundry Corp.
Medina	Rochester	Abex Corporation
Newburgh	--	Fred Michael & Son
Norwich	--	Bennett-Ireland, Inc.
Olean	--	Carley Mfg. Co., Inc.

State City	SMSA	Company
NEW YORK (cont.)		
Olean	--	Clark Bros. Co.
Oneida	Syracuse	Oneida Foundries, Inc.
Oswego	Syracuse	Sawyer Foundry & Machine Works
Owego	Binghamton	Tioga Foundry Corp.
Painted Post	--	Ingersoll-Rand Co.
Phelps	--	Ontario Foundry Co., Inc.
Plattsburgh	--	Plattsburgh Foundry & Machine Co., Inc.
Poughkeepsie	--	Intertype Co., Foundry Dept.
Randolph	--	Metallic Ladder Mfg. Corp.
Ravena	Albany-Schenectady-Troy	Ravena Iron Co., Inc.
Rochester	Rochester	General Signal Corp.
Rochester	Rochester	Bausch & Lomb, Inc.
Rochester	Rochester	Gleason Works, Inc.
Rochester	Rochester	Anstice Co., Inc.
Rochester	Rochester	Abex Corp.
Rochester	Rochester	Ritter Pfaudler Corp.
Rochester	Rochester	McGraw Edison Co.
Rochester	Rochester	Sargent & Greenleaf, Inc.
Schenectady	Albany-Schenectady-Troy	General Electric Co.
Seneca Falls	--	Goulds Pumps, Inc.
Shortsville	--	Papec Machine Co.
Staten Island	New York	Bethlehem Steel Corp.
Staten Island	New York	S. S. White Co.
Suffern	New York	International Nickel Co., Inc.
Syracuse	Syracuse	Crouse Hinds Co.
Syracuse	Syracuse	Syracuse Foundry, Inc.

State City	SMSA	Company
NEW YORK (cont.)		
Syracuse	Syracuse	Stanton Foundry, Inc.
Troy	Albany-Schenectady-Troy	Ross Iron Foundry
Utica	Utica-Rome	Kelly Foundry & Machine Co.
Utica	Utica-Rome	Utica General Jobbing Foundry, Inc.
Utica	Utica-Rome	Utica Steam Eng. & Boiler Works
Utica	Utica-Rome	Utica Radiator Corp.
Utica	Utica-Rome	Hart & Crouse Corp.
Walton	--	Walton East Branch Foundry Corp.
Watertown	--	New York Air Brake Co.
Watertown	--	Black-Clawson Co., Inc.
Watervliet	Albany-Schenectady-Troy	Cardish Machine Works, Inc.
Watervliet	Albany-Schenectady-Troy	Watervliet Iron & Brass Foundry, Inc.
Yonkers	New York	Otis Elevator Co.
Yonkers	New York	Unicast Development Corp.
NORTH CAROLINA		
Asheville	Asheville	Post Machinery Company
Biscoe	--	Foundry Service, Inc.
Burlington	--	Sykes Foundry & Machine Co.
Charlotte	Charlotte	Queen City Foundry Co.
Charlotte	Charlotte	Charlotte Pipe & Foundry Company
Charlotte	Charlotte	Cole Mfg. Company
Cherryville	--	Cherryville Foundry Works
Dunn	--	John A. McKay Mfg. Co.
Elizabeth City	--	Sanders Co.
Elkin	--	Brown Machine Co.

State City	SMSA	Company
NORTH CAROLINA (cont.)		
Gastonia	--	Stovall Foundry, Inc.
Gastonia	--	Kluttz Machine and Foundry, Inc.
Gastonia	--	Kistler Iron Works
Goldsboro	--	Dewey Bros., Inc.
Granite Falls	--	Granite Machine Co.
Greensboro	Greensboro-Winston-Salem-High Point	Industrial Foundry & Mfg. Co.
Greensboro	Greensboro-Winston-Salem-High Point	Guilford Foundry Co.
Greensboro	Greensboro-Winston-Salem-High Point	Pomona Foundry Co.
Greensboro	Greensboro-Winston-Salem-High Point	Wysong & Miles Foundry, Inc.
Hickory	--	Concrete Machinery Co., Inc.
La Grange	--	Hardy & Newsom, Inc.
Leland	Wilmington	G. R. Ennis & Son Foundry
Lewiston	--	Harrington Foundry Co., Inc.
Mooresville	--	Holshousers, Inc.
North Wilkesboro	--	Lineberry Foundry and Machine Co.
Raleigh	Raleigh	Southern Foundry Corp.
Ranlo	--	Cocker Machine & Foundry Co.
Rockingham	--	Standard Foundry & Mfg. Co.
Sanford	--	Hallman Foundry, Inc.
Shelby	--	Shelby Foundry & Machine Shop
Statesville	--	Statesville Castings, Inc.
Statesville	--	J. C. Steel and Sons, Inc.
Troutman	--	Sherill Machine Shop & Troutman Foundry
NORTH DAKOTA		
Fargo	Fargo-Moorhead	Fargo Foundry Steel and Mfg. Co.

State City	SMSA	Company
OHIO		
Akron	Akron	XXth Century Heating & Vent Co.
Akron	Akron	Knapp Foundry Company
Akron	Akron	Atlantic Foundry Co.
Akron	Akron	State Foundry Company
Akron	Akron	Diamond Foundry Co.
Akron	Akron	Tritts Foundry Company
Alliance	Canton	Babcock & Wilcox Co. Research Foundry
Andover	--	Andover Pattern Co.
Ashland	--	Union Malleable Mfg. Co.
Ashland	--	F. E. Myers & Bro. Co.
Barberton	Akron	Akron Standard Mold Co. Lectromelt
Barberton	Akron	Rockwell Mfg. Co.
Barberton	Akron	Babcock & Wilcox Co. Spec. Prod.
Bellaire	Wheeling	Bellaire Pattern & Foundry Co.
Belpre	--	Pioneer City Casting Co.
Berea	Cleveland	Ford Motor Co., Cleveland Foundry
Bettsville	--	Zoller Casting Co.
Blanchester	--	Blanchester Foundry Co., Inc.
Bucyrus	--	Bucyrus Castings Co.
Canton	Canton	Bonnot Company
Canton	Canton	Stark Foundry Co.
Canton	Canton	United Engineering & Foundry Co.
Canton	Canton	Frantz Mfg. Co.
Canton	Canton	U.S. Steel Corp. Roll & Mach. Works
Cedarville	Dayton	Morris Bean & Co.

State City	SMSA	Company
OHIO (cont.)		
Cincinnati	Cincinnati	Reliance Foundry Co.
Cincinnati	Cincinnati	Chris Erhart Foundry & Mach. Co.
Cincinnati	Cincinnati	Cincinnati Milling Mach. Co.
Cincinnati	Cincinnati	Standard Castings of Cincinnati, Inc.
Cincinnati	Cincinnati	Buckeye Foundry Co.
Cincinnati	Cincinnati	Oberhelman-Ritter Foundry Company
Cincinnati	Cincinnati	Tri-State Foundry Co.
Cleveland	Cleveland	Forest City Foundries Co.
Cleveland	Cleveland	Forest City Foundries Co.
Cleveland	Cleveland	Atlas Foundry, Inc.
Cleveland	Cleveland	Madison Foundry Co.
Cleveland	Cleveland	Republic Steel Corp. Foundry Dept.
Cleveland	Cleveland	Grabler Mfg. Co.
Cleveland	Cleveland	Algem Foundry Co.
Cleveland	Cleveland	Valley Mould & Iron Corp.
Cleveland	Cleveland	Cuyahoga Foundry Co.
Cleveland	Cleveland	Taylor & Boggis Foundry
Cleveland	Cleveland	Dornback Furnace & Foundry Co.
Cleveland	Cleveland	Hines Flask Co.
Cleveland	Cleveland	Norton Foundry Co.
Cleveland	Cleveland	Zellner Foundry Co.
Cleveland	Cleveland	Meech Foundry, Inc.
Cleveland	Cleveland	Parker-Street Castings Co.
Coldwater	--	Avco Corp.
Columbiana	--	Columbiana Foundry Co.

State City	SMSA	Company
OHIO (cont.)		
Columbiana	--	N. R. M. Corp. Foundry Div.
Columbiana	--	Columbiana Pump Co.
Columbiana	--	Production Foundry Co.
Columbus	Columbus	Jaeger Machine Company
Columbus	Columbus	Battelle Memorial Inst. Columbus Lab.
Columbus	Columbus	Kinnear Mfg. Co.
Columbus	Columbus	Lattimer-Stevens Co.
Columbus	Columbus	Chase Foundry & Mfg. Co.
Columbus	Columbus	Edwin Poulton Foundry Co.
Columbus	Columbus	Weinman Pump Mfg. Co.
Columbus	Columbus	Pulling Foundry Co.
Coshocton	--	James B. Clow & Sons, Inc.
Coshocton	--	Keagy & Lear Machine Co.
Crestline	--	Burch Corp.
Crestline	--	Burch Corp.
Dayton	Dayton	Duriron Company, Inc.
Dayton	Dayton	Kuhns Bros. Co.
Dayton	Dayton	Dayton Malleable Iron Co.
Dayton	Dayton	Dayton Casting Co.
Dayton	Dayton	Advance Foundry Co.
Dayton	Dayton	Kramer Bros. Foundry Co.
Dayton	Dayton	National Foundry & Furnace co.
Dayton	Dayton	Mercer Foundry Co.
Dayton	Dayton	National Cash Register Co.
Dayton	Dayton	Bimac Corp.

State City	SMSA	Company
OHIO (cont.)		
Defiance	--	General Motors Corp.
Delaware	Columbus	J. G. Castings Co.
Delaware	Columbus	General Casting Co.
Deshler	--	Cast Metals, Inc.
Dover	--	Shenango Company Dover Plant
East Liverpool	--	Lane Foundry
Elyria	Lorain-Elyria	Standard Screw Co.
Elyria	Lorain-Elyria	Chromalloy American Corp. Elyria Foundry
Elyria	Lorain-Elyria	Kasper Foundry Co.
Elyria	Lorain-Elyria	Duplex Mfg. & Foundry Co.
Fostoria	Toledo	Eltra Corp.
Fredericktown	--	J. B. Foote Foundry Co.
Fremont	--	Kelsey-Hayes Co.
Galion	--	Jeffrey Galion Mfg. Co.
Grafton	Lorain-Elyria	W. O. Larson Foundry Co.
Greenfield	--	Greenfield Foundry Co.
Hamilton	Hamilton-Middletown	Black Clawson Co., Inc.
Hamilton	Hamilton-Middletown	H. P. Deuscher Company
Hamilton	Hamilton-Middletown	Hamilton Foundry, Inc.
Harrison	Hamilton-Middletown	Campbell-Hausfeld Co.
Hillsboro	--	Herschel White Foundry Co.
Hillsboro	--	Blackmores Gray Iron Foundry
Jackson	--	Ohio Stove Co.
Lancaster	--	Alten Foundry & Mach. Works, Inc.
Lima	Lima	Ohio Steel Foundry Co.

State City	SMSA	Company
OHIO (cont.)		
Lorain	Lorain-Elyria	U.S. Steel Corp. Lorain Works
Louisville	Canton	Colonial Foundry Company
Mansfield	Mansfield	Borg-Warner Corp.
Marion	--	Marion Casting Co.
Martins Ferry	Wheeling	James H. Beans Foundry Co.
Miamisburg	Dayton	Miami Foundry Co.
Miamisburg	Dayton	Barry Foundry, Inc.
Middletown	Hamilton-Middletown	Black-Clawson Co., Inc.
Minister	--	Minister Machine Co.
Morral	--	Murphy Shellmold & Casting Co.
Mt. Vernon	--	Cooper Industries, Inc.
Napoleon	--	Heller-Aller Company
New Lexington	--	Star Foundry & Machine Co.
Newton Falls	Youngstown-Warren	Republic Steel Corp. Newton Falls Pt.
North Baltimore	Toledo	Smith Foundry & Machine Co.
Norwalk	--	Norwalk Foundry Co.
Oak Hill	--	Oak Hill Foundry & Mach. Works
Orrville	--	Quality Castings Co.
Orrville	--	Ohio Injector Co.
Painesville	Cleveland	Coe Manufacturing Co.
Pique	Dayton	Champion Foundry Co.
Plymouth	Mansfield	Fate-Root-Heath Co. Plymouth Loco Works
Portsmouth	--	Portsmouth Casting, Inc.
Portsmouth	--	Ohio Stove Co.
Portsmouth	--	Dayton Portsmouth Foundry

State City	SMSA	Company
OHIO (cont.)		
Quincy	--	Quincy Foundry, Inc.
Ravenna	Akron	A. C. Williams Company
Ripley	--	Ripley Foundry & Mach. Co.
Salem	--	Quaker City Castings, Inc.
Salem	--	Crane Co.
Salem	--	Pittsburgh Foundry & Mach. Co.
Salem	--	W. Murray Corp.
Sandusky	--	Sandusky Foundry & Mach. Co.
Sandusky	--	G & C Foundry Co.
Sandusky	--	Brown Industries, Inc.
Sidney	--	Textron, Inc.
Sidney	--	Gartland-Haswell Foundry Co.
Springfield	Springfield	White Motor Co.
Springfield	Springfield	O. S. Kelly Co.
Springfield	Springfield	J & J Foundry, Inc.
Springfield	Springfield	Duplex Mill & Mfg. Co.
Springfield	Springfield	Wickham Piano Plate Co.
Springfield	Springfield	Bauer Bros. Company Foundry Div.
St. Marys	--	St. Marys Foundry Co.
Steubenville	Steubenville-Weirton	Wheeling Steel Corp.
Tallmadge	Akron	East Akron Casting Co.
Tiffin	--	Webster Mfg., Inc.
Tiffin	--	Grabler Mfg. Co.
Tiffin	--	Tiffin Foundry, Inc.
Toledo	Toledo	Alloy Founders, Inc.
Toledo	Toledo	Binney Castings Co.

State City	SMSA	Company
OHIO (cont.)		
Troy	Dayton	Hobart Mfg. Co.
Upper Sandusky	--	Kocsis Foundry & Mfg. Co., Inc.
Wadsworth	Cleveland	Wadsworth Foundry Co.
Wauseon	--	Wauseon Foundry
Wellington	Lorain-Elyria	Sterling Foundry Co.
Wilmington	--	Wilmington Casting co.
Wooster	--	Wooster Products, Inc.
Xenia	Dayton	Xenia Foundry & Machine Co.
Youngstown	Youngstown-Warren	Youngstown Foundry & Mach. Co.
Youngstown	Youngstown-Warren	Youngstown Foundry & Mach. Co.
Youngstown	Youngstown-Warren	Comm. Sheraring & Stamping Co.
Zanesville	--	Mach. & Supply Co. Wise Foundry
Zanesville	--	Zane Casting Co., Inc.
Zanesville	--	Burnham Corp.
OKLAHOMA		
Bartlesville	--	Reda Pump Co.
Blackwell	--	Acme Foundry & Mach. Co.
Dewey	--	J & S Foundry, Inc.
Enid	--	Enid Foundry & Mach. Co.
Muskogee	--	Muskogee Iron Works
Oklahoma City	Oklahoma City	Enterprise Foundry, Inc.
Quapaw	--	General Power, Inc.
Tonkawa	--	Tonkawa Foundry
Tulsa	Tulsa	Tulsa Iron Works
Tulsa	Tulsa	Empire Foundry Co.

State City	SMSA	Company
OKLAHOMA (cont.)		
Tulsa	Tulsa	Sentinel Mfg. Co.
Tulsa	Tulsa	Big Four Foundry Co., Inc.
Tulsa	Tulsa	Borg-Warner Corp.
Tulsa	Tulsa	Ferrous Nelson Elec. Mfg. Co.
OREGON		
Albany	--	Albany Foundry
Astoria	--	Astoria Foundry
Bend	--	Mid-Oregon Iron Works, Inc.
Eugene	Eugene	Valley Iron and Steel Co.
Independence	Salem	Jeddeloh Bros. Sweed Mills, Inc.
Klamath Falls	--	Klamath Iron Works
Portland	Portland	Portland Foundry Co.
Portland	Portland	Industrial Iron Works
Portland	Portland	Crawford and Doherty Foundry
Portland	Portland	Northwest Foundry and Furnace Co.
Portland	Portland	Portland Iron Works
Portland	Portland	Oregon Brass Works, Inc.
Portland	Portland	Payne Bronze & Aluminum Foundry
Portland	Portland	Rich Mfg. Co.
Portland	Portland	Western Foundry Co.
Salem	Salem	W. W. Rosebraugh Co.
Salem	Salem	Salem Iron Works
Tualatin	Portland	Durametal Mfg. Co., Inc.
PENNSYLVANIA		
Allentown	Allentown-Bethlehem-Easton	Kline Hardware Co.

State City	SMSA	Company
PENNSYLVANIA (cont.)		
Ashland	--	Goyne Pump Co.
Athens	--	Athens Foundry Corp.
Auburn	Binghamton	Ecco Foundry & Machine Co.
Avonmore	Pittsburgh	General Steel Industries, Inc.
Bath	Allentown-Bethlehem-Easton	Cast Metal Mfg. Co.
Beaver Falls	Pittsburgh	Mayfield Foundry
Beaver Falls	Pittsburgh	Wilkofsky Bros., Inc.
Bellefonte	--	Wingate Foundry
Belleville	--	Sperry-Rand Corp.
Benton	--	Benton Foundry
Bethlehem	Allentown-Bethlehem-Easton	Bethlehem Steel Corp.
Bethlehem	Allentown-Bethlehem-Easton	Bethlehem Corp.
Birdsboro	Reading	Birdsboro Casting Co.
Bloomsburg	--	Allen Sherman Hoff Pump Co.
Blossburg	--	J. P. Ward Foundries, Inc.
Bolivar	Pittsburgh	Allegheny Foundry Co., Inc.
Boyertown	Reading	Union Mfg. Co., Inc.
Boyertown	Reading	Eastern Foundry Co.
Braddock	Pittsburgh	U.S. Steel Corp.
Bristol	Philadelphia	Burlington Foundry
Brunnerville	Lancaster	Brunnerville Iron Foundry
Butler	--	Butler Engine & Foundry Co.
Chambersburg	--	Chambersburg Eng. Co.
Chambersburg	--	T. B. Woods Sons Co.
Charleroi	Pittsburgh	Corning Glass Works

State City	SMSA	Company
PENNSYLVANIA (cont.)		
Cherryville	Allentown-Bethlehem-Easton	Dieters Foundry
Chester	Philadelphia	Crown Non-Ferrous Foundry, Inc.
Clarks Summit	Scranton	Miles Foundry
Clay	Lancaster	Clay Casting Co.
Clearfield	--	Clearfield Machine Co.
Corapolis	Pittsburgh	Homestead Valve Mfg. Co.
Corry	Erie	Cooper Industries, Inc.
Cowanesque	--	Cowanesque Valley Iron Works
Creighton	--	Glassmere Castings Co.
Downington	Philadelphia	Beloit Corp.
Dubois	--	Osborn Machine Co.
East Stroudsburg	--	Kulp Foundry, Inc.
Easton	Allentown-Bethlehem-Easton	Treadwell Corp.
Ellwood City	Pittsburgh	Ellwood Casting Co.
Ellwood City	Pittsburgh	U.S. Steel Corp.
Ellwood City	Pittsburgh	National Plumbing Fixture Corp.
Emmaus	Allentown-Bethlehem-Easton	Pennebacker Co., Inc.
Emmaus	Allentown-Bethlehem-Easton	Emmaus Foundry and Machine Co., Inc.
Ephrata	Lancaster	Ephrata Mfg. Co.
Erie	Erie	Erie Malleable Iron Co.
Erie	Erie	Zurn Industries, Inc.
Erie	Erie	Reed Mfg. Co.
Erie	Erie	Erie Castings Co.
Erie	Erie	Urick Foundry Co.
Erie	Erie	Superior Bronze Corp.

State City	SMSA	Company
PENNSYLVANIA (cont.)		
Erie	Erie	Weil McLain Co., Inc.
Erie	Erie	Bucyrus Erie Co.
Fairview	Erie	Fairview Casting Co.
Fairview Village	Philadelphia	Howmet Corp.
Ford City	--	Pittsburgh Plate Glass Co.
Franklin	--	Mutual Foundry Co.
Franklin	--	Chicago Pneumatic Tool Co.
Fullerton	Allentown-Bethlehem-Easton	Dent Hardware Co.
Girard	Erie	Lake Erie Foundry, Inc.
Greensburg	Pittsburgh	Woodward Foundries, Inc.
Greensburg	Pittsburgh	Walworth Co.
Greensburg	Pittsburgh	Hempfield Foundries Co.
Greenville	Pittsburgh	W. S. Hodge Foundry, Inc.
Grove City	--	Johnstone Foundries, Inc.
Grove City	--	Copper Industries, Inc.
Hallstead	--	Hallstead Foundry, Inc.
Hamburg	Reading	Pennsylvania Steel Foundry & Machine Co.
Hamburg	Reading	Hamburg Plow Works, Inc.
Hamburg	Reading	Gould Moody, Inc.
Hamburg	Reading	Fairmont Foundry, Inc.
Hamburg	Reading	Confer Smith and Co., Inc.
Hanover	York	R. H. Sheppard Co., Inc.
Hanover	York	Pennsylvania Mar Foundries, Inc.
Harrisburg	Harrisburg	W. O. Hickok Mfg. Co.
Hazelton	Wilkes-Barre-Hazelton	Barrett-Haentjens & Co.

State City	SMSA	Company
PENNSYLVANIA (cont.)		
Hollidaysburg	Altoona	McLanahan Corp.
Hyde Park	Reading	Hyde Park Foundry & Mach. Co.
Irwin	Pittsburgh	Irwin Sensenich Corp.
Jeannette	Pittsburgh	Truxell Foundry Co.
Johnstown	Johnstown	Bethlehem Steel Corp.
Johnstown	Johnstown	U.S. Steel Corp.
Kittanning	--	Kittanning Foundry & Machine Co.
Kutztown	Reading	Kutztown Foundry and Machine Co.
Lancaster	Lancaster	Posey Iron Works, Inc.
Lancaster	Lancaster	Emhart Corp.
Lancaster	Lancaster	Burnham Corp.
Landisville	Lancaster	Brubaker Mfg. Co., Inc.
Latrobe	Pittsburgh	Latrobe Steel Co.
Latrobe	Pittsburgh	Latrobe Foundry Machine & Supply Co.
Latrobe	Pittsburgh	Vulcan Mold & Iron Co.
Lebanon	--	Washington St. Brass & Iron Foundry
Lebanon	--	Keystone Foundry and Machine Co.
Lewistown	--	Lewistown Foundry and Machine Co.
Lititz	Lancaster	Oregon Castings Co.
Littlestown	York	Littlestown Hardware & Foundry Co.
Macungie	Allentown-Bethlehem-Easton	E. Pennsylvania Foundry Co.
Manheim	Lancaster	Fuller Co.
Manheim	Lancaster	Bond Foundry and Machine Co.
Manor	Pittsburgh	H & H Foundry Machine Co.
Marienville	--	Marienville Foundry Co.

State City	SMSA	Company
PENNSYLVANIA (cont.)		
Meadow Lands	Pittsburgh	Abex Corp.
Midland	Pittsburgh	Crucible Steel Co. of America
Midland	Pittsburgh	E. W. Bliss Co.
Modena	Philadelphia	Seamless Modena Foundries, Inc.
Monaca	Pittsburgh	Beaver Valley Alloy Foundry Co.
Monaca	Pittsburgh	Rheem Mfg. Co.
Monogahela	Pittsburgh	Combustion Eng., Inc.
Mt. Jewett	--	Mt. Jewett Foundry & Machine, Inc.
Mt. Joy	Lancaster	Grey Iron Castings Co.
Mt. Joy	Lancaster	Florin Foundry and Mfg. Co.
Mt. Pleasant	Pittsburgh	Mt. Pleasant Foundry
Muncy	--	Sprout Waldron & Co., Inc.
Myerstown	--	Industrial Casting Co.
New Castle	--	Crane Co.
New Castle	--	New Castle Foundry Co.
North Wales	Philadelphia	King Foundries, Inc.
Oil City	--	U.S. Steel Corp.
Penn	Pittsburgh	Hockensmith Corp.
Philadelphia	Philadelphia	U.S. Navy
Philadelphia	Philadelphia	Link-Belt Co.
Philadelphia	Philadelphia	Bonair Foundry Co.
Philadelphia	Philadelphia	Schneider Bowman Co., Inc.
Philadelphia	Philadelphia	Globe Enterprises
Philadelphia	Philadelphia	Chambers Bros. Co.
Philadelphia	Philadelphia	Simon Scullin Foundry, Inc.

State City	SMSA	Company
PENNSYLVANIA (cont.)		
Philadelphia	Philadelphia	Dodge Steel Co.
Philadelphia	Philadelphia	H. G. Enderlein Co., Inc.
Philadelphia	Philadelphia	Edgewater Steel Co.
Philadelphia	Philadelphia	Perseverance Iron Foundry, Inc.
Pittsburgh	Pittsburgh	Schaffer Goodnow Foundries, Inc.
Pittsburgh	Pittsburgh	Blaw-Knox Co. Foundry
Pittsburgh	Pittsburgh	Springfield Foundry Co.
Pittsburgh	Pittsburgh	Rosedale Foundry & Machine Co.
Pittsburgh	Pittsburgh	Blaw-Knox Co. Foundry
Pittsburgh	Pittsburgh	Sterrit-Thomas Foundry Co.
Pittsburgh	Pittsburgh	E. W. Bliss Co.
Pittsburgh	Pittsburgh	Shenango, Inc.
Pottstown	Philadelphia	Pottstown Machine Co.
Pottstown	Philadelphia	March Brownback Co., Inc.
Pottstown	Philadelphia	Keystone Grey Iron Foundry Co.
Quakertown	Philadelphia	Buffalo Pipe and Foundry Corp.
Reading	Reading	Bords Aluminum & Brass Foundry
Reading	Reading	Reading Gray Iron Castings, Inc.
Reading	Reading	U.S. Foundry Corp.
Reading	Reading	Textile Machine Works
Rochester	Pittsburgh	Correct Foundry & Mfg. Co.
Royersford	Philadelphia	Spring Ford Foundry & Machine Co., Inc.
Royersford	Philadelphia	Royersford Foundry & Machine Co., Inc.
Saxonburg	--	Saxonburg Foundry
Scottdale	Pittsburgh	Scottsdale Ozone Co.

State City	SMSA	Company
PENNSYLVANIA (cont.)		
Scranton	Scranton	J. W. Pinnell Foundry
Scranton	Scranton	Penn Bros. Foundry
Scranton	Scranton	Carbondale Grate Bar Co.
Sharpsburg	Pittsburgh	Sharpsburg Foundry Co.
Shippensburg	Harrisburg	Domestic Pump & Mfg. Corp.
Shoemakersville	Reading	General Signal Corp.
Sinking Spring	Reading	Hofmann Industries, Inc.
Slatington	Allentown-Bethlehem-Easton	Peters Foundry, Inc.
Somerset	Johnstown	Somerset Foundry & Machine Co.
Souderton	Philadelphia	Richmond Ring Co., Inc.
South Fork	Johnstown	S. Fork Foundry & Machine Co.
Spring City	Philadelphia	Spring City Foundry Co., Inc.
St. Clair	--	Leed Founders, Inc.
Star Junction	--	Perry Foundry & Mfg. Co.
Stowe	Philadelphia	Stanley G. Flagg & Co., Inc.
Stroudsburg	--	Pocono Foundry and Machine Co., Inc.
Tatamy	Allentown-Bethlehem-Easton	Tetamy Products Co.
Topton	Reading	Caloric Corp.
Troy	--	Ironcast, Inc.
Union City	Erie	A. L. Poling & Son
Washington	Pittsburgh	Washington Mould Machine & Foundry Co.
Watsontown	--	Watsontown Foundry and Mfg. Co.
Waynesboro	--	Frick Co.
Waynesboro	--	Landis Tool Co.
Weatherly	--	Weatherly Foundry & Mfg. Co.
West Salisbury	Johnstown	M. Knecht & Sons

State City	SMSA	Company
PENNSYLVANIA (cont.)		
Williamsport	--	Williamsport Foundry Co., Inc.
Williamsport	--	Darling Valve & Mfg. Co.
Wilmerding	Pittsburgh	Westinghouse Air Brake Co.
Wrightsville	York	Riverside Foundry Co., Inc.
Wyano	Pittsburgh	Wyano Foundry, Inc.
Wyoming	Wilkes-Barre-Hazleton	United Foundries, Inc.
York	York	Koppers Co., Inc.
York	York	Eyster-Weiser Co.
RHODE ISLAND		
Cranston	Providence-Pawtucket-Warwick	Grinnell Corp.
Esmond	Providence-Pawtucket-Warwick	Narragansett Gray Iron Foundry, Inc.
Providence	Providence-Pawtucket-Warwick	Brown & Sharpe
Providence	Providence-Pawtucket-Warwick	City Foundry Co.
Providence	Providence-Pawtucket-Warwick	Seaboard Foundry, Inc.
Warren	Providence-Pawtucket-Warwick	Warren Foundry
West Warwick	Providence-Pawtucket-Warwick	L. Brayton Foundry Co.
Woonsocket	Providence-Pawtucket-Warwick	Fairmont Foundry Co.
Woonsocket	Providence-Pawtucket-Warwick	Cumberland Foundry, Inc.
SOUTH CAROLINA		
Anderson	--	Foundry & Steel, Inc.
Anderson	--	Machine Parts Corp.
Cayce	Columbia	Cayce Iron and Brass Foundry
Charleston	Charleston	Pittsburgh Metallurgical Co., Inc.
Charleston	Charleston	Midgetts Foundry Co.
Charleston	Charleston	U.S. Navy
Greenville	Greenville	Steel Heddle Mfg. Co.

State City	SMSA	Company
SOUTH CAROLINA (cont.)		
Greenville	Greenville	Eagle Iron Works
Greenville	Greenville	Bahan Textile Machine Co., Inc.
Greenwood	--	Roberts Co.
Greenwood	--	Kirkman & Dixon Machine Co.
Greenwood	--	Greenwood Mills
Lancaster	--	Spring Cotton Mills
Spartanburg	--	Draper Corp.
Spartanburg	--	Carolina Foundry and Machine Works
Sumter	--	Sumter Machinery Co.
SOUTH DAKOTA		
Aberdeen	--	Safeguard Precision Products, Inc.
Lead	--	Homestake Mining Co.
TENNESSEE		
Athens	--	Athens Stove Works, Inc.
Athens	--	Athens Plow Co.
Bristol	--	W. H. Phelps & Sons
Bristol	--	Bristol Foundry & Machine Co.
Chattanooga	Chattanooga	Mueller Co.
Chattanooga	Chattanooga	U.S. Pipe and Foundry Co.
Chattanooga	Chattanooga	U.S. Pipe and Foundry Co.
Chattanooga	Chattanooga	U.S. Pipe and Foundry Co.
Chattanooga	Chattanooga	Tennessee Stove Works
Chattanooga	Chattanooga	Harriman Mfg. Co., Inc.
Chattanooga	Chattanooga	Crane Co.
Chattanooga	Chattanooga	Ross-Meehan Foundries, Inc.

State City	SMSA	Company
TENNESSEE (cont.)		
Chattanooga	Chattanooga	Whelan Foundry
Chattanooga	Chattanooga	Abex Corp.
Chattanooga	Chattanooga	Eureka Foundry Co.
Chattanooga	Chattanooga	T & H Co.
Chattanooga	Chattanooga	Acheson Foundry & Machine Works
Clarksville	--	Clarksville Foundry & Machine Works, Inc.
Cleveland	--	Hardwick Stove Co.
Cleveland	--	Cleveland Foundry & Mfg. Co., Inc.
Cleveland	--	Brown Stove Works, Inc.
Cleveland	--	Magic Chef, Inc.
Johnson City	--	Johnson City Foundry & Machine Works, Inc.
Johnson City	--	Inter-State Foundry & Machine Co.
Kingsport	--	Cedar Grove Foundry
Kingsport	--	Kingsport Foundry & Mfg. Corp.
Knoxville	--	Robertshaw Controls Co.
Knoxville	--	W. J. Savage Co.
Knoxville	--	Keller Foundry Co.
Knoxville	--	Blount St. Foundry Co.
Knoxville	--	Whitaker Foundry
Knoxville	--	Tennessee Valley Foundry
Knoxville	--	Knoxville Foundry Co.
Lewisburg	--	Lewisburg Casting Co., Inc.
Memphis	Memphis	International Harvester Co.
Memphis	Memphis	Memphis Machine Works, Inc.
Memphis	Memphis	Tennessee Fabricating Co.

State City	SMSA	Company
TENNESSEE (cont.)		
Memphis	Memphis	M. B. Parker
Memphis	Memphis	Layne & Bowler, Inc.
Memphis	Memphis	Standard Brake Shoe & Foundry Co.
Nashville	Nashville	Jakes Foundry Co.
Nashville	Nashville	Allen Products Corp.
Nashville	Nashville	John Bouchard & Sons, Inc.
Nashville	Nashville	Nashville Casting Co.
S. Pittsburg	--	U.S. Stove Co.
S. Pittsburgh	--	Lodge Mfg. Co.
Sweetwater	--	Vestal Mfg. Co.
TEXAS		
Amarillo	Amarillo	Globe Foundry & Machine Co.
Amarillo	Amarillo	Amarillo Foundry
Beaumont	Beaumont-Port Arthur-Orange	Oil City Brass works, Inc.
Beaumont	Beaumont-Port Arthur-Orange	Darling Valve of Texas
Brenham	--	Beaumier Iron Works
Conroe	Houston	Jordans Foundry
Corpus Christi	Corpus Christi	Gulf Star Foundries
Corpus Christi	Corpus Christi	Nueces Foundry, Inc.
Corsicana	--	Oil City Iron Works
Dallas	Dallas	Ft. Worth Steel & Machine Co.
Dallas	Dallas	Dallas Foundry, Inc.
Dallas	Dallas	Refinery Castings Co.
Dallas	Dallas	Murray Co. of Texas, Inc.
Dallas	Dallas	Shaw Foundry Co.

State City	SMSA	Company
TEXAS (cont.)		
Edinburg	McAllen-Pharr-Edinburg	Crow Iron Works
El Paso	El Paso	Grubbs Foundry
El Paso	El Paso	Darbyshire Steel Co., Inc.
Ft. Worth	Ft. Worth	McKinley Iron Works
Ft. Worth	Ft. Worth	Trinity Valley Iron & Steel Co.
Ft. Worth	Ft. Worth	American Mfg. Co. of Texas
Frisco	Dallas	Earl Bradley & Associates
Gainesville	--	Gainesville Foundry, Inc.
Galveston	Galveston-Texas City	Farmers Marine Copper Works, Inc.
Grand Prairie	Dallas	Bass & Hays Foundry
Hearne	--	Hearne Steel Co., Inc.
Houston	Houston	Bayou City Foundry
Houston	Houston	Lloyd Metal Foundry Co.
Houston	Houston	National Lead Co.
Houston	Houston	Abex Corp.
Houston	Houston	Brass & Alloy Casting Co.
Houston	Houston	Pioneer Foundry
Houston	Houston	Greens Bayou Foundry
Houston	Houston	Keen Foundry
Houston	Houston	Davis Foundry
Houston	Houston	Commercial Foundry Co.
Houston	Houston	Castings & Eng. Prod. Corp.
Houston	Houston	W. F. Curlee Mfg. Co.
Lone Star	--	Lone Star Steel Co.
Longview	--	G. A. Kelly Plow Co.
Longview	--	Engineered Castings, Inc.

State City	SMSA	Company
TEXAS (cont.)		
Lufkin	--	Texas Foundries, Inc.
Lufkin	--	Lufkin Foundry & Machine Co.
Marshall	--	Smith Steel Casting Co.
Marshall	--	Marshall Car Wheel & Foundry Co.
Mineral Wells	--	Bateman Foundry & Machine Co.
Pampa	--	Pampa Foundry Co.
Pittsburgh	--	Rudolph Foundry Co.
Plano	Dallas	Precision Mfg. Co.
Pt. Arthur	Beaumont-Port Arthur-Orange	Standard Brass & Mfg. Co.
Richmond	Houston	ACF Industries, Inc.
San Angelo	San Angelo	Western Iron Works
San Angelo	San Angelo	San Angelo Foundry & Machine Co.
San Angelo	San Angelo	B & W Eng. & Mfg. Co.
San Antonio	San Antonio	Perry Shankle Co.
San Antonio	San Antonio	Alamo Iron Works
San Antonio	San Antonio	Texaloy Foundry Co., Inc.
San Juan	McAllen-Pharr-Edinburg	Valley Iron Works
Sherman	Sherman-Denison	Sherman Foundry Co.
Temple	--	Hanson Industries, Inc.
Texarkana	Texarkana	Texas Foundry & Supply Co.
Tyler	Tyler	Woodward Iron Co.
Waco	Waco	Alamo Steel & Mach. Co.
Wichita Falls	Wichita Falls	Wichita Falls Foundry & Mach. Co.
Wichita Falls	Wichita Falls	Production Foundry Co., Inc.
Wichita Falls	Wichita Falls	Taylor Foundry Co.

State City	SMSA	Company
UTAH		
Ogden	Ogden	Ogden Iron Works Co.
Provo	Provo-Orem	U.S. Steel Corp.
Provo	Provo-Orem	Pacific St. Cast Iron Pipe Co.
Provo	Provo-Orem	Charles H. Cox Foundry
Provo	Provo-Orem	Backman Foundry & Mach.
Salt Lake City	Salt Lake City	Pippy Foundry
Salt Lake City	Salt Lake City	Eimco Corp.
Salt Lake City	Salt Lake City	May Foundry & Machine Co.
Spanish Fork	Salt Lake City	Spanish Fork Foundry, Inc.
VERMONT		
Barre	--	Smith-Whitcomb & Cook Co.
Hardwick	--	Sam Daniels Mfg. Co., Inc.
Poultney	--	Gray Foundry, Inc.
Rutland	--	Patch-Wegner Co., Inc.
Rutland	--	How Richardson Scale Co.
Springfield	--	Vermont Foundries, Inc.
St. Johnsbury	--	Colt Industries, Inc.
Swanton	--	Precision Metal Product Corp.
VIRGINIA		
Alexandria	Washington	Temple Foundry, Inc.
Bluefield	--	Thistle Foundry and Machine Co.
Buena Vista	--	Buena Vista Foundry Co.
Chester	--	A B C Foundry
Culpeper	--	Bingham and Taylor Corp.
Danville	--	Perkinston Foundry & Machine Co.

State City	SMSA	Company
VIRGINIA (cont.)		
Emporia	--	Emporia Foundry, Inc.
Hampton	Newport News-Hampton	NASA
Lynchburg	Lynchburg	J. M. Bell Foundry, Inc.
Lynchburg	Lynchburg	Woodward Iron Co.
Lynchburg	Lynchburg	Glamorgan Pipe and Foundry Co.
Newport News	Newport News-Hampton	Womack Foundry
Newport News	Newport News-Hampton	Newport News Shipbuilding & Dry Dock Co.
Norfolk	Norfolk-Portsmouth	Old Dominion Foundry Works, Inc.
Norfolk	Norfolk-Portsmouth	Berkley Mach. Works & Foundry Co., Inc.
Norfolk	Norfolk-Portsmouth	Richard Foundry Corp.
Petersburg	--	E. E. Titus, Inc.
Portsmouth	Norfolk-Portsmouth	U.S. Navy
Pulaski	--	Schrader Foundry
Radford	--	Woodward Iron Co.
Richmond	Richmond	Josam Mfg. Co.
Richmond	Richmond	Strickland Foundry & Mach. Co.
Richmond	Richmond	O. K. Foundry Co., Inc.
Richmond	Richmond	Golden Age Foundry
Richmond	Richmond	Southern Industries, Inc.
Roanoke	Roanoke	Virginia Foundry Co.
Roanoke	Roanoke	White Foundry Co., Inc.
Roanoke	Roanoke	Walker Mach. and Foundry Co.
Roanoke	Roanoke	Roanoke Foundry Mach. Co.
Roanoke	Roanoke	Grays Foundry
Roanoke	Roanoke	Norfolk & Western Rwy. Foundry

State City	SMSA	Company
VIRGINIA (cont.)		
Salem	Roanoke	Graham White Mfg. Co.
Suffolk	--	Tidewater Foundry Corp.
Waynesboro	--	Virginia Metalcrafters, Inc.
Winchester	--	Snapp Foundry Products Co.
WASHINGTON		
Bellingham	--	Union Foundry Co.
Bremerton	--	U.S. Navy
Everett	Seattle-Everett	Washington Stove Works, Inc.
Everett	Seattle-Everett	Black Clawson Co.
Everett	Seattle-Everett	Sather Mfg. Co., Inc.
Hoquiam	--	Long Foundry Co.
Roslyn	--	Roslyn Foundry Co.
Seattle	Seattle-Everett	Salmon Bay Foundry Co., Inc.
Seattle	Seattle-Everett	Star South Seattle Foundry Co.
Seattle	Seattle-Everett	Olympic Foundry Co.
Seattle	Seattle-Everett	Elliott Bronze Co.
Seattle	Seattle-Everett	Washington Iron Works
Spokane	Spokane	Washington Machine & Supply Co.
Spokane	Spokane	St. Louis Brass & Iron Works
Spokane	Spokane	Inland Foundry Co.
Tacoma	Tacoma	Atlas Foundry & Machine Co.
Tacoma	Tacoma	Fick Foundry Co.
Tacoma	Tacoma	Acme Foundry, Inc.
Vancouver	Portland	Vancouver Iron & Steel Foundry Co., Inc.
Wenatchee	--	S & M Foundry

State City	SMSA	Company
WASHINGTON (cont.)		
Yakima	--	Yakima Machine & Foundry Co.
Yakima	--	Cascade Casting Co.
WEST VIRGINIA		
Charleston	Charleston	Charleston Foundry Co.
Charleston	Charleston	Kanawha Mfg. Co.
Clarksburg	--	Hart Bros. Machine Co.
Clarksburg	--	Quality Foundry Co., Inc.
Elkins	--	Kelly Foundry & Machine Co.
Fairmont	--	Helmick Foundry-Machine Co.
Huntington	Huntington-Ashland	Myers Foundry and Machine Co.
Huntington	Huntington-Ashland	ACF Industries, Inc.
New Martinsville	--	Lanham Foundry Co.
Wheeling	Wheeling	Centre Foundry and Machine Co.
Wheeling	Wheeling	Blaw-Knox Co.
Worthington	--	Fischer Foundry
WISCONSIN		
Adell	--	Adell Foundry Co.
Appleton	--	Allis-Chalmers Mfg. Co.
Beaver Dam	--	Malleable Iron Range Co.
Beaver Dam	--	Kirsh Foundry, Inc.
Belgium	Milwaukee	Belgium Foundry Co.
Beloit	--	Colt Industries, Inc.
Beloit	--	Beloit Corp.
Beloit	--	Beloit Corp.
Berlin	--	Berlin Chapman

State City	SMSA	Company
WISCONSIN (cont.)		
Brillion	--	Brillion Iron Works, Inc.
Browntown	--	Iroquois Foundry Co.
Cedar Grove	--	J. M. Nash Co.
Cedar Grove	--	J. M. Bruce Foundry, Inc.
Cedar Grove	--	Gilt Edge Foundry Co.
De Pere	Green Bay	C. A. Lawton Co.
Evansville	--	Baker Mfg. Co.
Eau Claire	--	Gould Nat-Batteries, Inc.
Fond Du Lac	--	Kiekhaefer Corp.
Fredonia	Milwaukee	Gilson Bros. Co.
Grafton	Milwaukee	Plymouth Foundry & Machine Co.
Grafton	Milwaukee	Grafton Foundry Co.
Green Bay	Green Bay	Green Bay Foundry & Machine Works
Green Bay	Green Bay	Rothe Foundry Co.
Hortonville	--	American Tool and Foundry
Hurley	--	Twin City Machine and Foundry Co.
Kaukauna	--	Roloff Mfg. Corp.
Kaukauna	--	Giddings & Lewis Machine Tool Co.
Kenosha	Kenosha	Arneson Foundry, Inc.
Kewaunee	--	Frank Hamacheck Mach. Co.
Kiel	--	Kiel Foundry Co., Inc.
Kohler	--	Kohler Co.
La Crosse	--	John Torrance & Son, Inc.
La Crosse	--	Allis-Chalmers Mfg. Co.
Lake Mills	--	St. Regis Paper Co.

State City	SMSA	Company
WISCONSIN (cont.)		
Madison	Madison	Wisconsin Foundry & Machine Co.
Madison	Madison	Giddings & Lewis Machine Tool Co.
Manitowoc	--	Manitowoc Grey Iron Foundry, Inc.
Menomonee Falls	Milwaukee	Falls Foundry Co.
Menomonie	--	Badger Iron Works
Milwaukee	Milwaukee	Allis-Chalmers Mfg. Co.
Milwaukee	Milwaukee	Grede Foundries, Inc.
Milwaukee	Milwaukee	Rex Chainbelt, Inc.
Milwaukee	Milwaukee	Pioneer Foundry Corp.
Milwaukee	Milwaukee	Mid-City Foundry Co.
Milwaukee	Milwaukee	International Harvester Co.
Milwaukee	Milwaukee	Norberg Mfg. Co.
Milwaukee	Milwaukee	Vilter Mfg. Corp.
Milwaukee	Milwaukee	National Metal Products
Milwaukee	Milwaukee	Grede Foundries, Inc.
Milwaukee	Milwaukee	Zenith Foundry Co.
Milwaukee	Milwaukee	Motor Castings Co.
Milwaukee	Milwaukee	Motor Castings Co.
Milwaukee	Milwaukee	Briggs & Stratton Corp.
Milwaukee	Milwaukee	Barclay Foundry, Inc.
Milwaukee	Milwaukee	Outboard Marine Corp.
Milwaukee	Milwaukee	Milwaukee Malleable & Grey Iron Works
Neenah	--	Neenah Foundry Co.
Nekoosa	--	Nekoosa Foundry & Machine Works, Inc.
Oshkosh	--	Universal Foundry Co.

State City	SMSA	Company
WISCONSIN (cont.)		
Palmyra	--	Palmyra Basic Foundry, Inc.
Pt. Washington	Milwaukee	Heatwole Foundry Co.
Racine	Racine	Standard Foundry Co.
Racine	Racine	American Skein & Foundry
Racine	Racine	Wisconsin Cylinder Foundry, Inc.
Racine	Racine	Iroquois Foundry Co.
Racine	Racine	J. I. Case Co.
Reedsburg	--	Grede Foundries, Inc.
Richland Center	--	Richland Center Foundry Co.
Ripon	--	A. F. Klinzing Co., Inc.
Sheboygan	--	Austin Gray Iron Foundry Corp.
Sheboygan	--	Sheboygan Foundry Co.
Sheboygan	--	Potts Foundry, Inc.
Slinger	Milwaukee	Slinger Foundry Co.
Sparta	--	Sparta Mfg. Co., Inc.
Superior	Duluth-Superior	Duplex Mfg. Co.
Superior	Duluth-Superior	Acme Foundry Co.
Two Rivers	--	Becker Mfg. Co.
Washburn	--	Washburn Foundry Co.
Waukesha	Milwaukee	Grede Foundries, Inc.
Waukesha	Milwaukee	General Castings Corp.
Waupaca	--	Waupaca Foundry, Inc.
Waupun	--	M & M Grayiron Foundry
Wausau	--	Murray Machinery, Inc.
Wausau	--	Marathon Electric Mfg. Co.
Whitewater	--	Whitewater Mfg. Co.

F.10 Nitric Acid

The commercial manufacture of nitric acid in this country is carried out by means of the ammonia oxidation process: an ammonia-air mixture is reacted catalytically at elevated temperature. Nitric oxide and water are formed, and the oxide is subsequently converted to nitrogen dioxide. An aqueous solution of approximately 50-60 percent nitric acid is produced by absorption of the nitrogen dioxide in water. These operations may be designed for atmospheric pressure or for the pressure process (80-120 pounds per square inch) used in most plants today.

There are 72 nitric acid plants(23) (see table F-13) with individual capacities over 25,000 tons annually. The map in figure F-10 shows the geographical distribution of the nitric acid plants in the United States. Total production in 1967 amounted to 6,122,000 tons of 100 percent acid.(24) Capacities range from 425,000 tons per year to 25,000 tons per year in a few small plants. Plant sites vary from urban to rural with 43 percent of the plants within SMSA's. The largest concentration of plants is in the Midwest and Southeast where the major portion of output is consumed in production of ammonium nitrate fertilizer.

The principal source of emissions in a nitric acid plant is the absorber. The effluent contains unreacted nitrogen oxides (mostly nitric oxide and nitrogen dioxide), oxygen, and nitrogen; trace amounts of acid mist or vapor may also be present. Nitric oxide is a colorless gas; nitrogen dioxide is red-orange-brownish in color. Normally the concentrations of nitrogen oxides discharged ranges between 0.1 and 0.6 percent by volume of effluent prior to any control treatment. Nitrogen

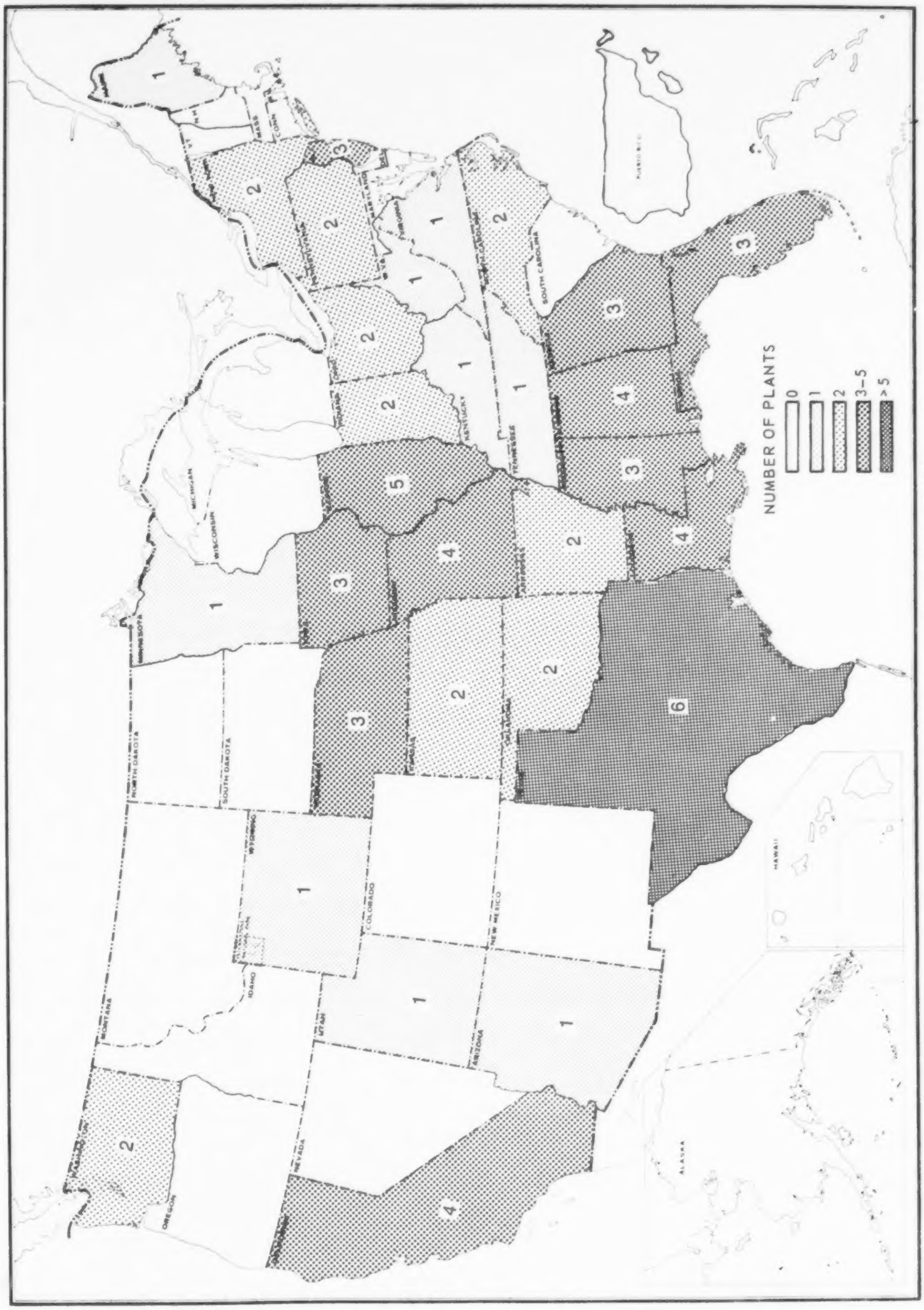
NUMBER OF PLANTS
0
1
2
3-5
>5
MONTANA
IDAHO
WYOMING
COLORADO
NEW MEXICO
ARIZONA
UTAH
NEVADA
OREGON
NORTH DAKOTA
SOUTH DAKOTA
MINNESOTA
WISCONSIN
MICHIGAN
KENTUCKY
TENNESSEE
SOUTH CAROLINA
ALASKA
HAWAII

Figure F-10. Nitric acid plants, 1968.

dioxide composes approximately one-half of the total nitrogen oxide pollutants from the absorber. Operational practices and equipment maintenance can have marked influence on rate of pollutant discharge.

Several means of abatement are available to control nitrogen oxides. Probably the most suitable one is a catalytic reduction system which decomposes 90 percent or more of the nitrogen oxides. The effluent from the absorber column is mixed with a fuel, such as hydrogen or natural gas, and passed over a catalyst bed; the nitrogen dioxide and nitric oxide are dissociated and converted into nitrogen, carbon dioxide, and water vapor. The energy generated in this operation may be recovered as useful heat and power. Plants equipped with catalytic fume eliminators usually operate with no visible plumes. However, in an absorber effluent with a high oxygen content, the quantity of fuel may need to be reduced to prevent excessively high temperature in the catalyst. Under these conditions the plume may be nearly colorless, although the reduced quantity of fuel is stoichiometrically insufficient to react with and eliminate most of the nitric oxide.

Catalytic fume abatement is being used increasingly to reduce nitrogen oxide emissions. Approximately 20 percent of nitric acid plants are so equipped. Scrubbing with caustic solutions is an alternate method of control but it is relatively inefficient and it introduces a liquid waste disposal problem. Adsorption systems and flaring may also be suitable in a limited number of instances.

Several new processes have been developed for producing acid of 98 percent strength, the processes requiring pressures of 700 to 3,000 pounds per square inch. Compared with a conventional high pressure plant not equipped with catalytic fume eliminators, nitrogen oxide emissions would be considerably lower.

Table F-13. NITRIC ACID PLANTS
With Capacities of 25,000 Tons or More Per Year
May 1968

State City	SMSA	Company	Capacity, 100% HNO_3 Tons per Year
ALABAMA			
Cherokee	--	USS Agri-Chemicals, Inc., Div. U.S. Steel Corp.	110,000
Ketona	Birmingham	Ketona Chemical Corp.	30,000
Midland City	--	United Chemical Corp.	150,000
Muscle Shoals	--	Tennessee Valley Authority	100,000
ARIZONA			
Curtiss	--	Apache Powder Co.	65,000
ARKANSAS			
El Dorado	--	Monsanto Co., Agricultural Div.	195,000
Helena	--	Arkla Chemical Corp., Delta Fertilizer Div.	90,000
CALIFORNIA			
Brea	Anaheim-Santa Ana-Garden Grove	Collier Carbon & Chemical Corp.	47,000
El Central	--	Valley Nitrogen Producers, Inc.	36,000
Hercules	Anaheim-Santa Ana-Garden Grove	Hercules, Inc.	50,000
Richmond	San Francisco-Oakland	Chevron Chemical Co., Ortho Div.	80,000
FLORIDA			
Pensacola	Pensacola	Chemstrand Co., Div. Monsanto Co.	110,000
Pensacola	Pensacola	Escambia Chemical Corp.	90,000
Tampa	Tampa-St. Petersburg	Kaiser Agricultural Div., Kaiser Aluminum & Chemical Corp.	35,000

State City	SMSA	Company	Capacity, 100% HNO_3 Tons per Year
GEORGIA			
Augusta	Augusta	Columbia Nitrogen Corp.	175,000
Bainbridge	--	Kaiser Agricultural Div., Kaiser Aluminum & Chemical Corp.	40,000
Savannah	Savannah	Kaiser Agricultural Div., Kaiser Aluminum & Chemical Corp.	140,000
ILLINOIS			
Cordova	Davenport-Rock Island-Moline	Nitrin, Inc.	90,000
Lockport	Chicago	Texaco, Inc.	75,000
Marseilles	--	Farm Chemicals Div., Hooker Chemical Corp.	50,000
Seneca	--	E. I. du Pont de Nemours & Co.	175,000
Tuscola	--	U.S. Industrial Chemicals Co., Div. National Distillers & Chemical Corp.	35,000
INDIANA			
Hammond	Gary-Hammond-East Chicago	Calumet Nitrogen Products Co.	40,000
Terre Haute	Terre Haute	Central Nitrogen, Inc.	125,000
IOWA			
Clinton	--	Hawkeye Chemical Co.	120,000
Fort Madison	--	Chevron Chemical Co., Ortho Div.	90,000
Port Neal	Sioux City	Terra Chemical International	125,000
KANSAS			
Lawrence	--	Cooperative Farm Chemicals Association	360,000
Pittsburg	--	Gulf Oil Corp., Chemicals Dept.	230,000
KENTUCKY			
Henderson	Evansville	Gulf Oil Corp., Chemicals Dept.	40,000

State City	SMSA	Company	Capacity, 100% HNO_3 Tons per Year
LOUISIANA			
Geismar	--	Allied Chemical Corp., Nitrogen Div.	210,000
Lake Charles	Lake Charles	Olin Mathieson Chemical Corp.	70,000
Luling	--	Monsanto Co., Agricultural Div.	195,000
Sterlington	Monroe	Commercial Solvents Corp.	160,000
MAINE			
Searsport	--	W. R. Grace & Co., Agricultural Products Div. (Northern Chemical Operations)	25,000
MINNESOTA			
Pine Bend	Minneapolis-St. Paul	Ammonia Products, Inc.	70,000
MISSISSIPPI			
Bay Springs	--	Kaiser Agricultural Div., Kaiser Aluminum & Chemical Corp.	45,000
Vicksburg	--	Gulf Oil Corp., Chemicals Dept.	80,000
Yazoo City	--	Mississippi Chemical Corp.	250,000
MISSOURI			
Crystal City	St. Louis	USS Agri-Chemicals, Inc., Div. U.S. Steel Corp.	85,000
Hannibal	--	American Cyanamid Co.	115,000
Louisiana	--	Hercules, Inc.	400,000
Webb City	--	Atlas Chemical Industries, Inc.	110,000
NEBRASKA			
Beatrice	--	Cominco American, Inc.	135,000
Fremont	--	Fel-Tex, Inc.	32,000
South Omaha	Omaha	Allied Chemical Corp., Agricultural Div.	90,000

State City	SMSA	Company	Capacity, 100% HNO_3 Tons per Year
NEW JERSEY			
Bound Brook	--	American Cyanamid Co.	25,000
Gibbstown	Philadelphia	E. I. du Pont de Nemours & Co.	220,000
Parlin	--	Hercules, Inc.	40,000
NEW YORK			
Buffalo	Buffalo	Allied Chemical Corp., Nitrogen Div.	60,000
Olean	--	Agway Nitrogen Center	60,000
NORTH CAROLINA			
Tunis	--	Farmers Chemical Association	180,000
Wilmington	Wilmington	Carolina Nitrogen Corp.	130,000
OHIO			
Lima	Lima	Solar Nitrogen Chemicals, Inc.	65,000
South Point	Huntington-Ashland	Allied Chemical Corp., Nitrogen Div.	240,000
OKLAHOMA			
Cherokee	--	Cherokee Nitrogen Co.	65,000
Pryor	--	Oklahoma Ordnance Works Authority	65,000
PENNSYLVANIA			
Newell	--	Allied Chemical Corp., Gen. Chemical Div.	40,000
Reynolds	--	Atlas Chemical Industries, Inc.	25,000
TENNESSEE			
Tyner	Chattanooga	Farmers Chemical Association	180,000

State City	SMSA	Company	Capacity, 100% HNO_3 Tons per Year
TEXAS			
Bay City	--	Celanese Chemical Co.	50,000
Beaumont	Beaumont-Port Arthur-Orange	Mobil Chemical Co., Div. Mobil Oil Corp.	154,000
Etter	--	Phillips Petroleum Co.	130,000
Kerens	--	Nipak, Inc.	50,000
Odessa	Odessa	El Paso Products Co., Div. El Paso Natural Gas	65,000
Orange	Beaumont-Port Arthur-Orange	E. I. du Pont de Nemours & Co.	140,000
UTAH			
Provo	Provo-Orem	USS Agri-Chemicals, Inc. Div. U.S. Steel Corp.	150,000
VIRGINIA			
Hopewell	--	Allied Chemical Corp., Nitrogen Div.	425,000
WASHINGTON			
Kennewick	--	Chevron Chemical Co., Ortho Div.	55,000
Kennewick	--	Phillips Pacific Chemical Co.	40,000
WEST VIRGINIA			
Belle	Charleston	E. I. du Pont de Nemours & Co.	80,000
WYOMING			
Cheyenne	--	Wycon Chemical	30,000